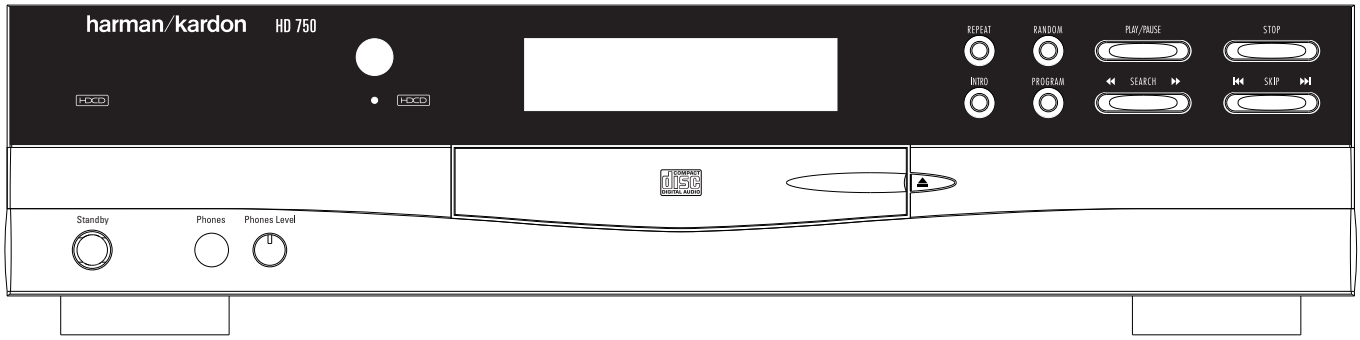
The Harman Kardon
Model HD750

COMPACT DISC PLAYER

Technical Manual



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* *Harman/ kardon continually strives to improve its products. The HD750 Compact Disc Player design and specifications are subject to change and may differ from the published specifications and descriptions, but will always equal or exceed the original specifications unless otherwise stated.*

DANGER: Invisible laser radiation when open and interlock failed or defeated.
AVOID DIRECT EXPOSURE TO BEAM.

harman/kardon

Parts and Service Office
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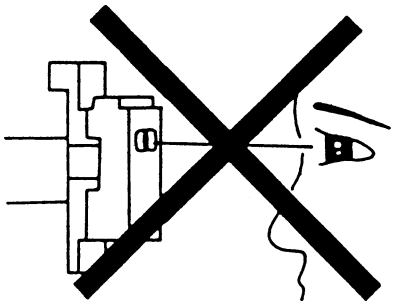
1112-FL8350 P9603 1200 Printed in Hong Kong

LASER BEAM SAFETY PRECAUTIONS

CLASS 1 LASER PRODUCT

CAUTION
Invisible laser radiation when the unit is open.
Do not stare into beam.

CAUTION: USE OF ANY CONTROLS, ADJUSTMENT, OR PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.



Do not look directly at the laser beam coming from the pickup or allow it to strike against your skin.

This compact disc player uses a pickup that emits a laser beam. The laser beam is emitted from the location shown in the figure. When checking the laser diode, be sure to keep your eyes at least 1 foot away from the pickup lens when the diode is turned on. Do not look directly at the laser beam.

CAUTION:
Using controls and adjustment, or doing procedures other than those specified herein, may result in hazardous radiation exposure.

SAFETY PRECAUTIONS

CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Caution: To prevent electric shock do not use this (polarized) plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Attention: Pour prévenir les chocs électriques ne pas utiliser cetre fiche polarisée avec un prolongateur, une prise de courant ou une autre sortie de courant, sauf si les lames prévent étre insérées à fond-sans en laisser aucune partie à découvert.

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

HANDLING LASER PICKUP

The laser diode in the optical system of this player can be damaged by electrostatic discharge from your clothes or your body. Proper electrostatic grounding for service personal is required during servicing.

BEFORE REPAIRING THE COMPACT DISC PLAYER

Preparation

Human Body Grounding:

Many of the components used in this compact disc player, including the laser pickup, are sensitive to electrostatic discharge. Service personal should be grounded with an electrostatic armband (1 Mohm).

Caution:

Static charge on clothing does not escape through a body grounding wrist band.

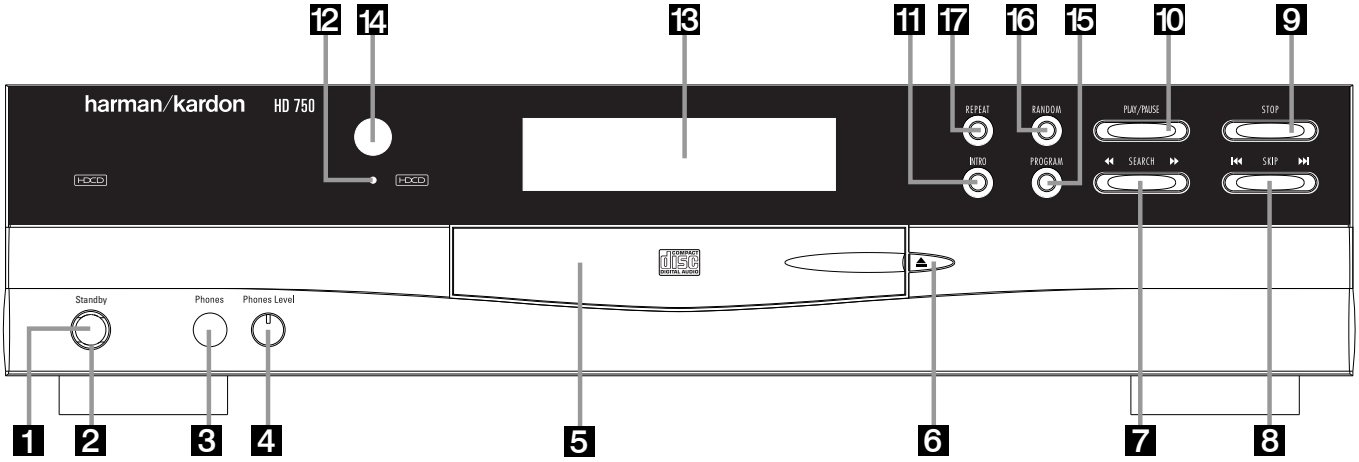
Be careful not to contact the pickup or electrical components with your clothing.

Workbench and Tool Grounding:

A properly-grounded electroconductive plate (1Mohm) or metal sheet should be fitted to the workbench surface. Tools and instruments (such as soldering irons and scopes) should be grounded to prevent AC leakage.

Note: Laser diodes are so susceptible to damage from static electricity that, even if a static discharge does not ruin a diode, it can shorten its life or cause it to work improperly.

Front Panel Controls



1 Power Switch
2 Status Mode Indicator
3 Headphones Jack
4 Headphones Level Control
5 CD Drawer
6 Open/Close Button
7 Search Button
8 Skip Button
9 Stop Button
10 Play/Pause Button
11 Repeat Button
12 HDCD Indicator
13 Information Display
14 Remote Sensor
15 Program Button
16 Random Button
17 Repeat Button

1 Power: Press this switch to apply power to the HD750. Then the **Status-Mode Indicator 2** will turn green, the **Information Display 13** will illuminate and all trays will be checked automatically for discs. Press the switch again to turn the unit off; the **Status-Mode Indicator 2** will turn amber, indicating that the unit is in Standby. When the HD750 is connected to a switched AC outlet, such as those found on the back of many audio products, and the AC outlet will be turned on, the unit will turn to Standby mode only.

2 Status-Mode Indicator: When the HD750 is in the On mode, this indicator will glow green. When the unit is off, the indicator will glow amber, indicating that the unit is still connected to AC power.

3 Headphones Jack: Connect a set of standard headphones to this jack for private listening.

15 Program Button: This button is used to program the playback of a disc in a particular order.

16 Random Button: Press this button to have all of the tracks played in a random order.

17 Repeat Button: Press this button once to repeat only the tracfk currently being played. Press it again to continually repeat all tracks on a disc.

4 Headphones Level Control: Turn this knob to increase or decrease the volume level for headphones connected to the HD750's **Headphones Jack 3**. Note that changing this level will not change the sound level for the unit's main output, as that remains constant.

5 CD Drawer: This drawer holds the discs that will be played. Press the **Open/Close** button **6** to open the drawer so that discs may be inserted.

6 Open/Close: Press this button to open or close the disc drawer. DO NOT push the drawer to close it or damage to the transport mechanism may result.

7 Search: Press one side of this button to search forward ►► or the other side of the button to search backwards ◄◄ through a disc to locate a particular portion of the disc being played.

8 Skip: Press the right side of this button to move to the next track ►►| or the left side of the button to move back to the previous track |◄◄ on the disc being played.

9 Stop: Press this button to stop the disc currently being played. During programming functions, this button is also used to exit the program mode.

10 Play/Pause Button: Press this button to start the playback of a CD. If the CD drawer is open, pressing this button will automatically close the drawer. When a disc is playing press this button once to momentarily stop a disc. When the button is pressed again, the disc will resume play at the point it was stopped.

11 Intro Button: Press this button to put the HD750 in teh Intro Scan mode. When you press the button, the unit will play the first 10 sec of each track on the disc, and then move to the next track. Press the button again to defeat the function and continue full play of the current track

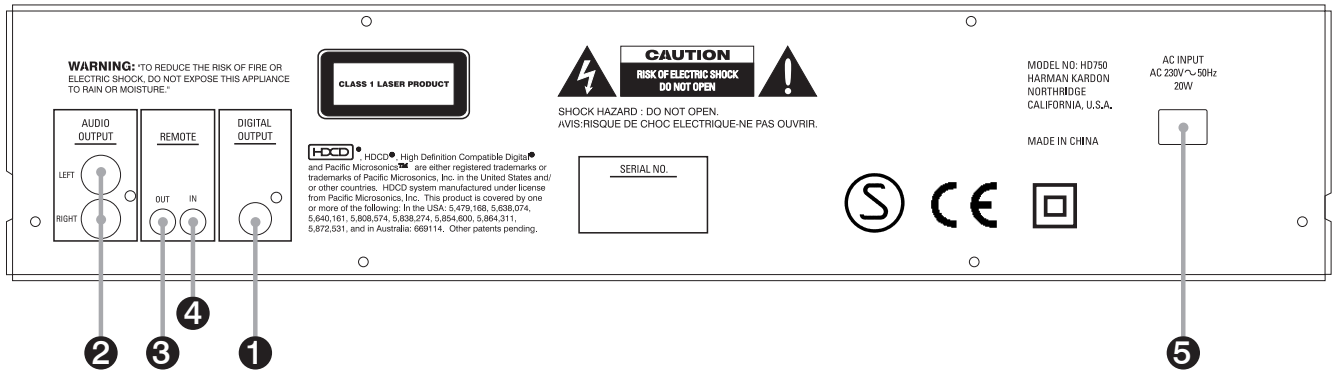
12 HDCD Indictaor: The LED will light automatically when a CD with HDCD encoding is playing. No further action is needed to enjoy the benefits of HDCD.

13 Information Display: This display provides details about the operation of the HD750.

14 Remote Sensor: The sensor behind this window receives commands from the remote control. Keep this area clear if you wish to use the HD750 with a remote control.

Important Note: When the unit is turned off (to Standby), pressing any button on the front panel will turn the unit on. When Play 5 10 on the front or on the remote is pressed, the unit will automatically turn on and start playing the disc actually loaded.

Rear Panel Connections


WARNING: "TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE."
CLASS 1 LASER PRODUCT
CAUTION
RISK OF ELECTRIC SHOCK DO NOT OPEN
SHOCK HAZARD : DO NOT OPEN.
AVIS:RISQUE DE CHOC ELECTRIQUE-NE PAS OUVRIR.
MODEL NO: HD750
HARMAN KARDON
NORTHRIDGE
CALIFORNIA, U.S.A.
MADE IN CHINA
AC INPUT
AC 230V~50Hz
20W
AUDIO OUTPUT
LEFT
RIGHT
REMOTE
OUT
IN
DIGITAL OUTPUT
SERIAL NO.
HDCD High Definition Compatible Digital and Pacific Microsonics are either registered trademarks or trademarks of Pacific Microsonics, Inc. in the United States and/or other countries. HDCD system manufactured under license from Pacific Microsonics, Inc. This product is covered by one or more of the following: In the USA: 5,479,168, 5,638,074, 5,640,161, 5,808,574, 5,838,274, 5,854,600, 5,864,311, 5,872,531, and in Australia: 669114. Other patents pending.
❷
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❹
❶
❺

❶ Digital Output
❷ Audio Outputs
❸ Remote Control Output
❹ Remote Control Input
❺ AC Power Cord

❶ **Digital Output:** Connect this jack to the coaxial digital input of an external digital-to-analog converter for direct access to the digital signals of HD750, DO NOT connect this jack to the standard audio inputs of any device.

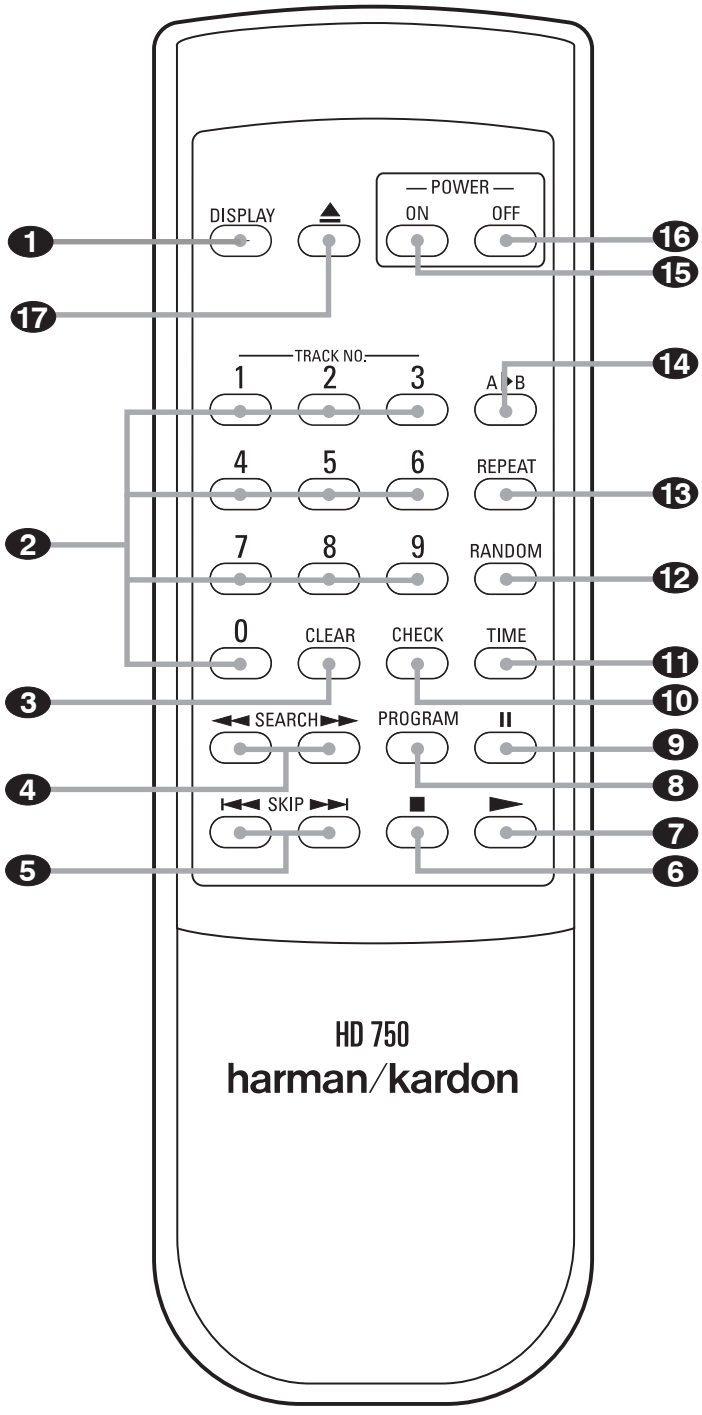
❷ **Audio Outputs:** Connect these jacks to the CD audio inputs of your receiver, surround processor or preamplifier.

❸ **Remote Control Output:** Connect this jack to the input of another compatible Harman Kardon remote controlled device to have the remote sensor on the HD750 provide signals to other products.

❹ **Remote Control Input:** Connect the output of a remote infrared sensor or the remote control output of another compatible Harman Kardon product. This will enable the remote control system to operate even when the front panel **Remote Sensor** is blocked. It will also allow use of the HD750 with optional, external control systems.

❺ **AC Power Cord:** Connect this plug to an AC outlet, if the outlet is switch controlled, make certain that the switch is in the ON position.

Remote Control Functions



1. Display Button
2. Numeric Controls
3. Clear Button
4. Search Buttons
5. Skip Buttons
6. Stop Button
7. Play Button
8. Program Button
9. Pause Button
10. Check Button
11. Time Button
12. Random Button
13. Repeat Button
14. A ▶ B Button
15. Power On
16. Power Off
17. Open/ Close Button

GENERAL INFORMATION

1. Power Consumption	Operating <18W; Standby <5W
2. Power Super	230V AC 50Hz
3. Dimensions	440 x 130 x 386mm
4. Product Outlook	Refer to attached diagram
5. Remote Unit	harman/kardon remote code
6. Compliance Requirement	i EMC EN55013, EN61000-3-2, EN61000-3-3, EN55022 ii. CE (LVD EN60065) iii. HDCD
7. Sound Processor	HDCD
8. CD Servo System	Digital Servo, Auto Alignment

AUDIO SPECIFICATION

	Typical	**Limit**
Output Level 1KHz 0dB (no HDCD)	1.0 Vrms	+-1dB
Output Level 1KHz 0dB (HDCD output)	2.0Vrms	+- 2dB
Frequency Response 20Hz~20KHz reference	+0-1dB	+0.5-1.5dB
THD 1KHz 0dB (30KHz Filter)	0.006%	0.01%
THD 1KHz 0dB (no any filter)	0.03%	0.08%
THD 20Hz~20KHz 0dB (30KHz Filter)	0.04%	0.05%
S/N 1KHz 0dB A-weighted (A Filter)	96dB	96dB
Dynamic Range	95dB	95dB
Channel Separation 1KHz 0dB(30KHz Filter)	94dB	90dB
Channel Balance	+-0.5dB	+-1.5dB
De-emphasis (5KHz,16KHz)	+-0.5dB	+-1.5dB

Headphone output specification under 32 ohm load

Maximum Headphone Output Level 1KHz 0dB	1.5Vp-p	+-0.2V
Frequency Response (20~20KHz)	+-1dB	+-1.5dB
THD 20~20KHz 0dB (30KHz Filter)	0.1%	0.2%

Test Disc Specification

	Typical	**Limit**
Black Dot TCD 725B	1000um	600um

Test Disc Specification

	Typical	Limit
Black Dot TCD 725B	1000um	600um
Interruption MCD-131	900um	600um
Finger print	75um	65um
Vertical Deviation MCD-151	0.92mm	0.92mm
Eccentricity TCD 712	140um	140um
8cm test disc TCD 783	Last Track	Last Track
Access Time 1st to last track YEDS18	4 sec	10 sec

Audio Characteristics Test Procedure

Test Equipment

1. 3346 CD Player Evaluating Filter x 2 (NF Electronic Instrument)
2. VP7722 Panasonic Audio Analyzer
3. Sony YEDS18 Test CD disc

Procedure

Equipment Setup

1. The audio output of the CD player under test is connected to the CD filter L & R inputs.
2. The outputs from the filter are connected to the Audio Analyzer.

Check the output Voltage

1. Set the mode of the filter to ' THRU'
2. Set the mode of Audio Analyzer to ' LEVEL' mode
3. Select track 2 of the test disc and play the CD disc
4. The output voltage and gain of the R & L channels are taken by pressing the respective buttons on the control board of Audio Analyzer.

Frequency Response

1. Set the mode of the filter to reference level mode.
2. Select the track 3, 4, 5, and 6 of the test disc and run it under ' Play' mode.
3. Check the output of the R & L Channels

Total Harmonic Distortion

1. Set the mode of the filter to ' DIST/CH-SP' mode
2. Set the audio analyzer to ' DIST' mode.
3. Set the unit of the audio analyzer to ' %' mode
4. Select the track 2, 4, and 5 on the test disc and run them under ' PLAY' mode
5. Check the % of each R & L channels

Signal to Noise Ratio

1. Set the mode of the filter to ' S/N' mode
2. Play track 2 of the test disc
3. The unit of the audio analyzer is set to dB mode
4. Press the S/N key on the control panel of the audio analyzer
5. Play track 7
6. Measure the data of S/N ratio

Dynamic Range

1. Set the mode of the filter to ' D-Range' mode
2. Set the audio analyzer to ' DIST' Mode
3. Set the unit of the audio analyzer to ' dB' mode
4. Play track 17of the test disc
5. The dynamic range should be |A| + 60dB

Channel Separation

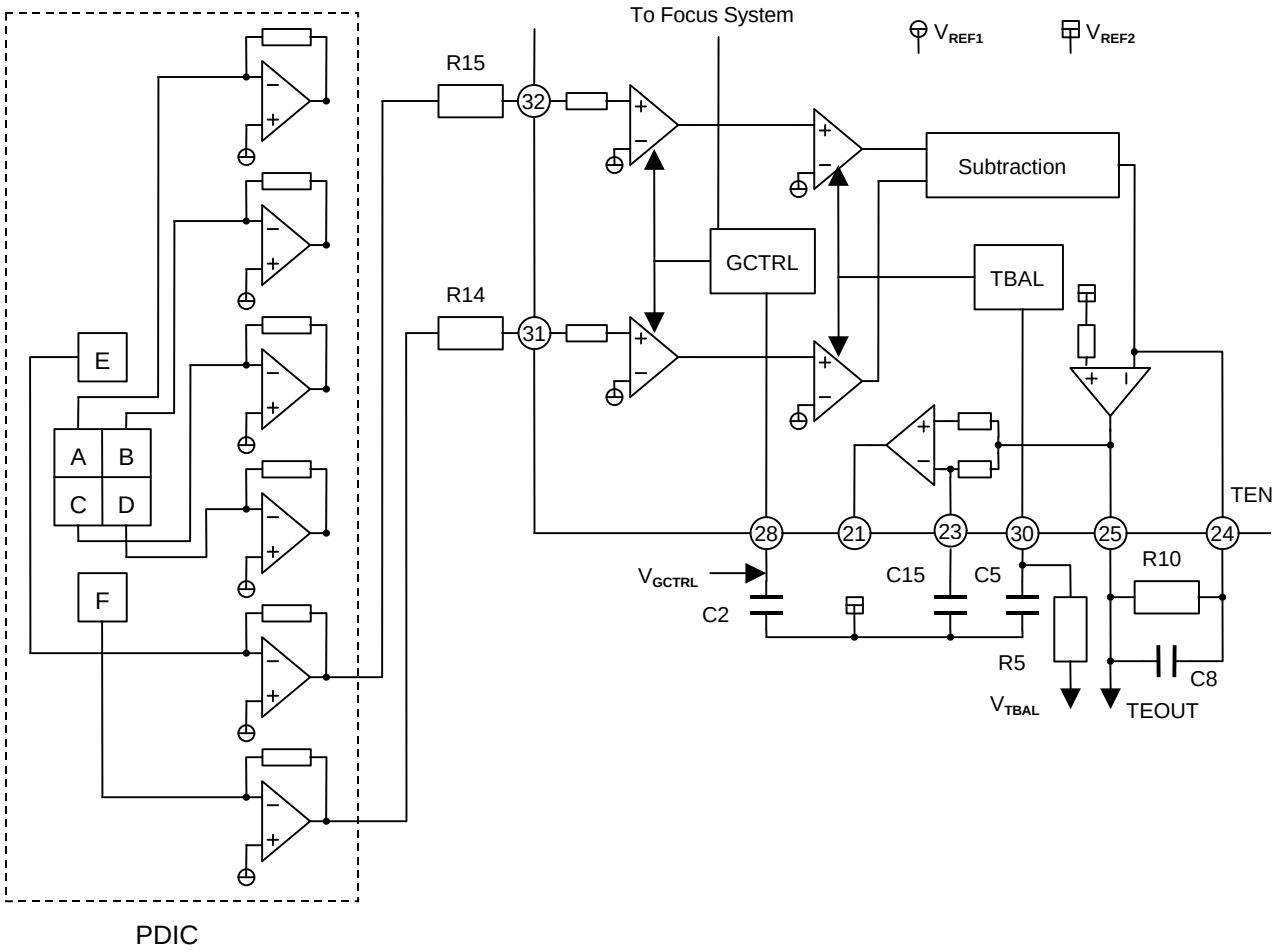
1. Set the mode of the filter to ' DIST/CH-SP' mode
2. Set the audio analyzer to ' LEVEL' mode
3. Play the tracks 8, 9, 10 & 11
4. The measured results is the difference between L & R channel

De-emphasis

1. Press the ' THRU' button of the CD filter
2. Play the track 2 of the test disc
3. Press the ' Relative Level' and make it ' ON'
4. Select the track 12 and 13 and measure the L & R channels value

FUNCTION DESCRIPTION

Tracking System

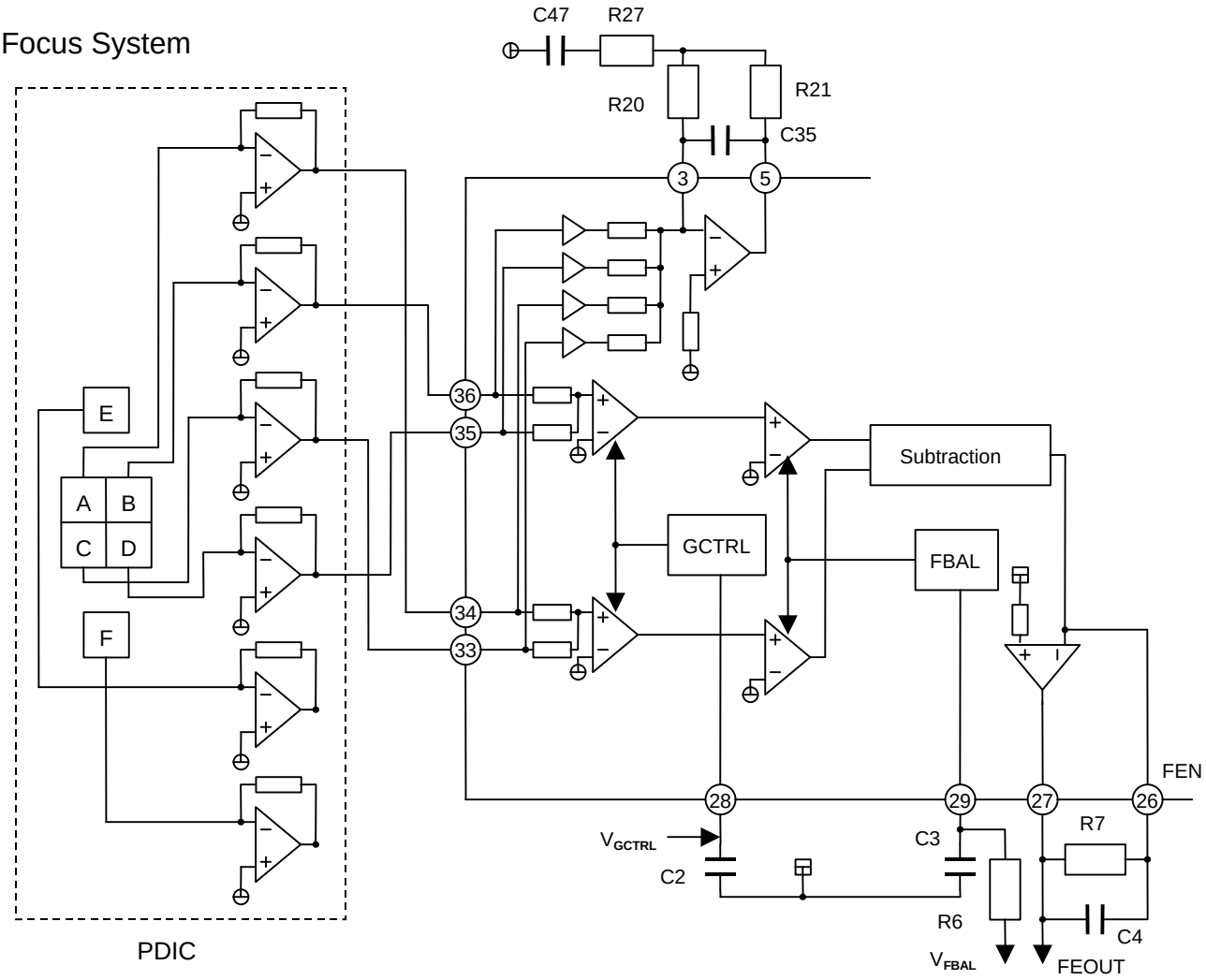


The tracking error output of E and F is given to Pin 25 (TEOUT). C8 is required for oscillation-proof. R10 is chosen such that TEOUT of Pin 25 become 1.4Vp-p.

During alignment procedure, the DSP IC (MN662790) will adjust the tracking balance voltage V_{TBAL} from Pin 31. V_{TBAL} varies with reference to the center voltage V_{REF2} (=1.65 V) within ±0.5 V.

The tracking gain will change according to the type of disc. For normal disc or CDR disc, V_{GCTRL} is set to V_{REF2}; for CDRW disc V_{GCTRL} is set to V_{REF2} - 0.75 V. At the same time, the focus gain is changed too.

Focus System

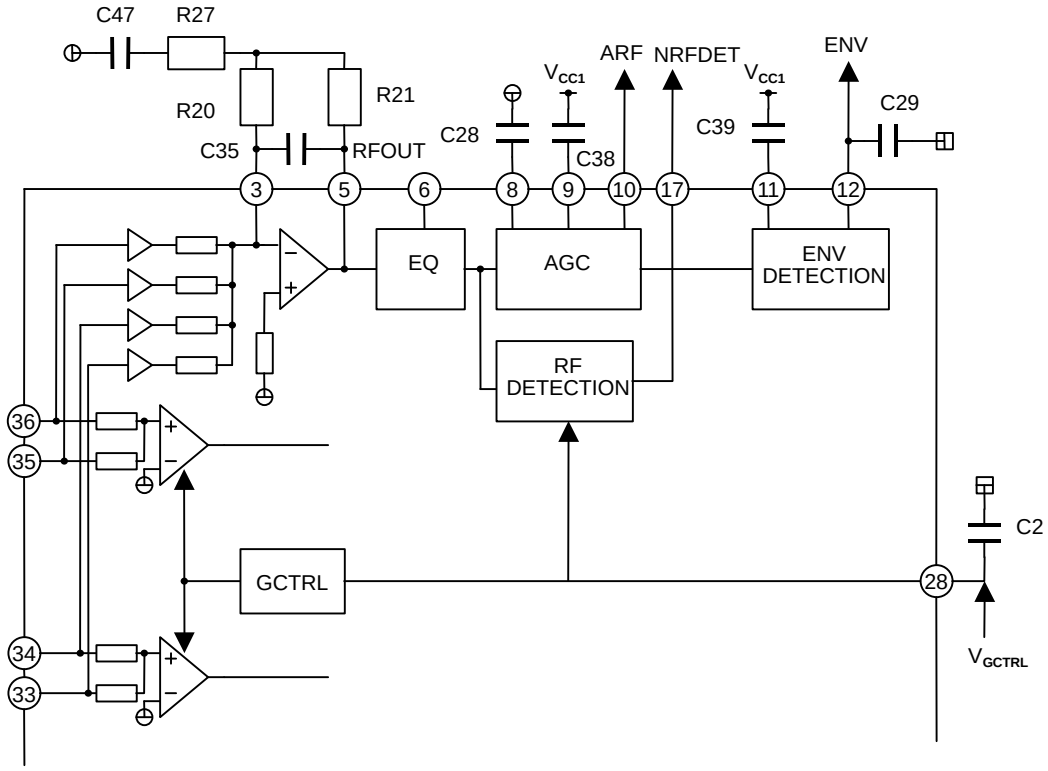


The focus error output of A, B, C and D are given to Pin 27. C4 is required for oscillation-proof. R7 is set such that FEOUT of Pin 27 becomes 1.46 Vp-p.

During alignment procedure, the DSP IC (MN662790) will adjust the focus balance voltage V_{FBAL} from Pin 30. V_{FBAL} varies with reference to the center voltage V_{REF2} (=1.65 V) within ±0.5 V.

The focus gain will change according to the type of disc. For normal disc or CDR disc, V_{GCTRL} is set to V_{REF2}; for CDRW disc V_{GCTRL} is set to V_{REF2} - 0.75 V. At the same time, the tracking gain is changed too.

RF, EQ, AGC



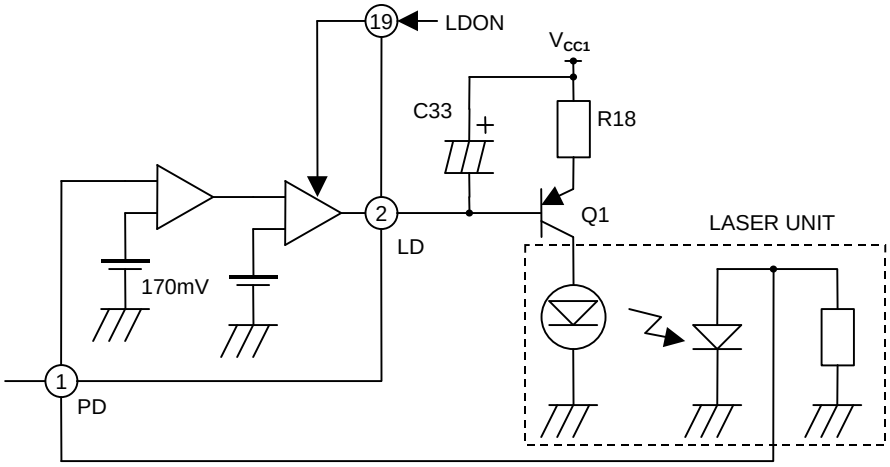
The signals A, B, C and D input from PDIC are composed into the RF signal by the RF Addition Amp, then output from RFOUT of Pin 5. This Amp is designed so that RFOUT is about 0.5 Vp-p for normal CD disc (about 0.4 Vp-p for CDR and 0.12 Vp-p for CDRW).

RF signal from Pin 5 is then input to the AGC block through the EQ block (the EQ characteristic is fixed for single speed operation in this design). It is then gain-controlled and output to Pin 10 ARF. The AGC block maintains the output level of ARF to about 1.0Vp-p for all types of disc. C38 connected to Pin 9 is for the AGC loop filter.

The RF Detection block detects the amplitude of the RF signal inputted from the EQ block. Inputted RF signal is detected after passing through a high-pass filter. Detection level is changed in accrodance with the voltage of GCTRL Pin 28.

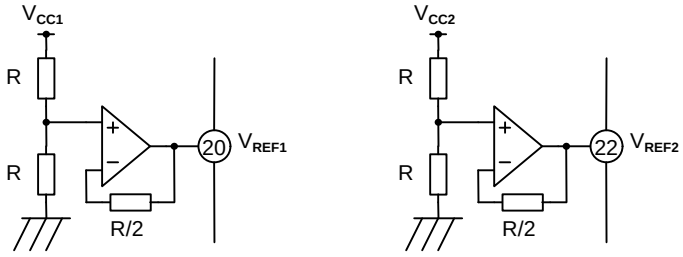
The ENV detection block detects the fluctuation of the 3T-composition in the RF signal which is needed for focus balance adjustment. C39 connected to Pin 11 forms a filter for detecting the signal fluctuation. The ENV output signal from Pin 12 is filtered by C29.

APC



The laser diode has large negative temperature characteristic in its optical output when driven with a constant current on laser diode. Therefore, the output on processing monitor photo diode, must be a controlled current for getting regular output power, thus the APC (Auto Power Control) circuit is composed.

Reference Power Supply



A reference power supply for servo is built-in. The current capacity of the reference supply is about 3 mA.

V_{REF1} = 1/2 V_{CC1} = 2.5 V

V_{REF2} = 1/2 V_{CC2} = 1.65 V

where V_{CC1} = 5 V and V_{CC2} = 3.3 V

MN662790RSA1

Signal Processing LSI for CD Players

■ Overview

The MN662790RSA is a CD signal processing LSI that, on a single chip, combines optics servos for the CD player (focus, tracking, and traverse servos), digital signal processing (EFM demodulation and error correction), digital servo processing for the spindle motor, digital filter, and D/A converter, so thus covers all signal processing functions from the head's RF amplifier onward.

■ Features

(Optics servo)

- Focus, tracking, and traverse servos
- Automatic adjustment functions for FO/TR gain, FO/TR offset, and FO/TR balance
- Built-in D/A converter for drive voltage output
- Built-in dropout countermeasures
- Anti-shock functions
- Built-in track cross counter
- Traverse speed detection function

(Digital Signal Processing)

- Built-in DSL and PLL
- Frame synchronization detection, holding, and insertion
- Subcode data processing
  - Subcode Q data CRC check
  - Built-in subcode Q data register
- CIRC error detection and correction
  - C1 decoder: duplex error correction
  - C2 decoder: triplex error correction
  - Built-in 16-K bits of RAM for use in de-interleaving
- Audio data interpolation
  - Averaging or retention of previous values
  - Digital attenuation (–12 dB)
- Audio data peak level detection function
- Digital audio interface (EIAJ format)
- Audio data serial interface for input and output

(Spindle Motor Servo)

- CLV digital servo
- Switchable servo gain

(Audio circuits)

- Digital filter using 8-fold oversampling
- Built-in D/A converter (1-bit D/A converter)
- Built-in differential operational amplifier (secondary low pass filter)

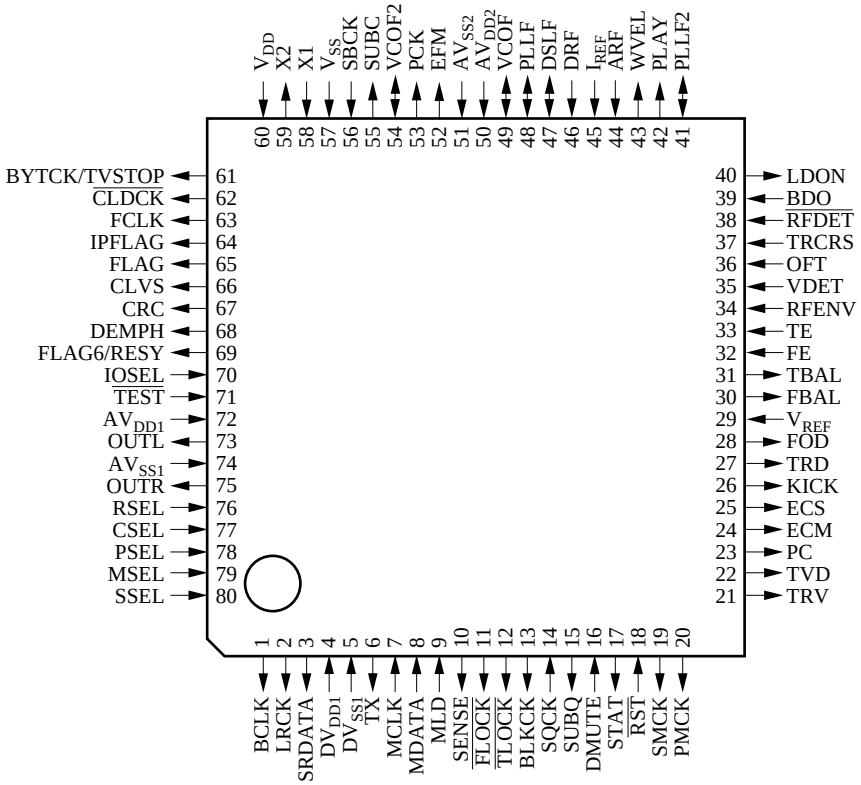
(Other)

- Built-in playback pitch control function (normal speed only) (±13%)
- Support for quadruple-speed playback (digital servo and signal processing block only)
- Built-in support for jitter-free disc rotation synchronization playback
- Oscillator shutdown mode
- Power management mode
- Operating voltage 3.3 V for internal circuit; 5 V for Digital input pins

■ Applications

- CD players

■ Pin Assignment

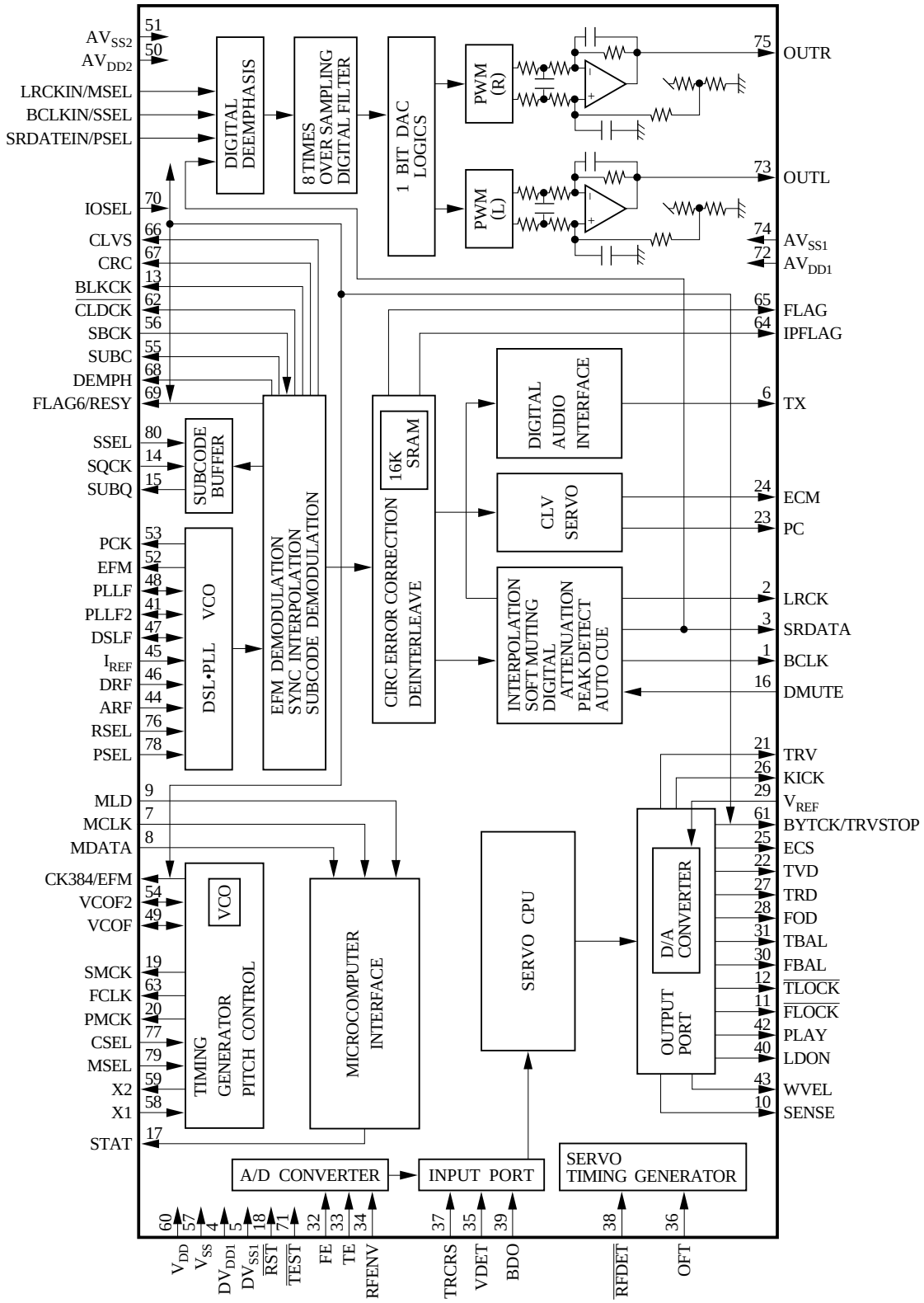


(TOP VIEW)

QFS080-P-1414

MN662790RAS1

■ Block Diagram



■ Pin Descriptions

Pin No.	Symbol	I/O	Function Description
1	BCLK	O	SRDATA bit clock output.
2	LRCK	O	Left/right channel discrimination signal output.
3	SRDATA	O	Serial data output.
4	DV_{DD1}	I	Power supply for digital circuits.
5	DV_{SS1}	I	Ground for digital circuits.
6	TX	O	Digital audio interface output signal.
7	MCLK	I	Microcomputer command clock input. (Data is latched at rising edge.)
8	MDATA	I	Microcomputer command data input.
9	MLD	I	Microcomputer command load signal input. "L" level: load.
10	SENSE	O	Sense signal output. (OFT, FESL, NACEND, NAJEND, SFG, and NWTEND)
11	$\overline{FLOCK}$	O	During default operation, focus servo convergence signal. "L" level: convergence. During command execution, direction detection output for external track counter.
12	$\overline{TLOCK}$	O	During default operation, tracking servo convergence signal. "L" level: convergence. During command execution, traverse speed control output.
13	BLKCK	O	Subcode block clock signal (f_{BLKCK}=75 Hz)
14	SQCK	I	External clock input for subcode Q register
15	SUBQ	O	Subcode Q data output
16	DMUTE	I	Muting input. (Effective only for an output bit rate of 64 f_s) "H" level: muting.
17	STAT	O	Status signal. (CRC, CLVS, TTSTOP, JCLVS, SQOK, FLAG6, SENSE, $\overline{FLOCK}$, $\overline{TLOCK}$, rpm data, and FCLV)
18	$\overline{RST}$	I	Reset input. "L" level: reset.
19	SMCK	O	If MSEL is "H" level, 8.4672 MHz clock signal output. If MSEL is "L" level, 4.2336 MHz clock signal output
20	CSEL	O	Oscillation frequency selection: "H" is 33.8688MHz; "L" is 16.9344MHz.
21	TRV	O	Traverse forced feed output. (tristate)
22	TVD	O	Traverse drive output.
23	PC	O	Spindle motor ON signal. "L" level: ON (default).
24	ECM	O	Spindle motor drive signal (forced mode output). (tristate)
25	ECS	O	Spindle motor drive signal (servo error signal output). (tristate)
26	KICK	O	Kick pulse output. (tristate)
27	TRD	O	Tracking drive output.
28	FOD	O	Focus drive output.
29	V_{REF}	I	Reference voltage for DA output (TVD, ECS, TRD, FOD, FBAL, and TBAL).
30	FBAL	O	Focus balance adjustment output.
31	TBAL	O	Tracking balance adjustment output.
32	FE	I	Focus error signal input. (analog input)

■ Pin Descriptions (continued)

Pin No.	Symbol	I/O	Function Description
33	TE	I	Tracking error signal input. (analog input)
34	RFENV	I	RF envelope signal input. (analog input)
35	VDET	I	Vibration detection signal input. "H" level: vibration detected.
36	OFT	I	Offtrack signal input. "H" level: offtrack.
37	TRCRS	I	Track cross signal input. (analog input)
38	$\overline{\text{RFDET}}$	I	RF detection signal input. "L" level: detected.
39	BDO	I	Dropout signal input. "H" level: dropout.
40	LDON	O	Laser ON signal output. "H" level: ON.
41	PLLF2	I/O	PLL loop filter characteristic selection pin.
42	TOFS	O	Tracking offset adjustment or DSL balance output(D/A output).
43	WVEL	O	Double-speed status signal output. "H" level: double-speed.
44	ARF	I	RF signal input.
45	I_{REF}	I	Reference current input pin.
46	DRF	I	DSL bias pin.
47	DSLF	I/O	DSL loop filter pin.
48	PLLF	I/O	PLL loop filter pin.
49	VCOF	I/O	VCO loop filter pin.
50	AV_{DD2}	I	Power supply for analog circuits (DSL, PLL, D/A converter output, and A/D converter).
51	AV_{SS2}	I	Ground for analog circuits (DSL, PLL, D/A converter output, and A/D converter).
52	EFM or CK384	O	EFM signal output. EFM output when IOSEL is "H" level. •Crystal oscillator 16.9344-MHz clock output when I •OSEL is "L" level. •384 f_s output from signal processing block. (During variable-pitch operation, this is the VCO clock.) Commands permit switching among the above three outputs.
53	PCK	O or DSLB	PLL derived clock or DSL balance output. f_{PCK} =4.3218 MHz.
54	VCOF2	I/O	VCO loop filter pin.
55	SUBC	O	Subcode serial output.
56	SBCK	I	Serial clock input for subcode serial output.
57	V_{SS}	I	Ground for oscillator circuit.
58	X1	I	Crystal oscillator circuit input/output pins. f=16.9344 MHz, 33.8688 MHz.
59	X2	O	Crystal oscillator circuit output/output pins. f=16.9344 MHz, 33.8688 MHz.
60	V_{DD}	I	Oscillator circuit power supply.
61	BYTCK or TRVSTOP	O	When IOSEL is "H" level, byte clock signal output. When IOSEL is "L" level, traverse stop signal output. "H" level: stop mode.
62	$\overline{\text{CLDCK}}$	O	Subcode frame clock signal output pin. (f_{CLDCK}=7.35 kHz)
63	FCLK	O	Crystal frame clock signal output. (f_{FCLK}=7.35 kHz)
64	IPFLAG	O	Interpolation flag signal output. "H" level: interpolation.
65	FLAG	O	Flag signal output.

■ Pin Descriptions (continued)

Pin No.	Symbol	I/O	Function Description
66	CLVS	O	Spindle servo phase synchronization signal output. "H" level: CLV. "L" level: rough servo.
67	CRC	O	During default operation, subcode CRC check result output. "H" level: OK. "L" level: no good. During command execution, pulse output for external track counter.
68	DEMPH	O	De-emphasis detection signal output. "H" level: ON.
69	FLAG6 or RESY	O	When IOSEL is "L" level, FLAG6 output, signal for resetting address of RAM for error correction de-interleave. "L" level: address reset. When IOSEL is "H" level, RESY output, frame resynchronization signal. "H" level: synchronized. "L" level: out of sync.
70	$\overline{\text{IOSEL}}$	I	Mode selection pin
71	TEST	I	Test pin. Keep this at "H" level.
72	AV_{DD1}	I	Power supply for analog circuits. (common use for left and right channel audio outputs.)
73	OUTL	O	Left channel audio output.
74	AV_{SS1}	I	Ground for analog circuits. (common use for left and right channel audio outputs.)
75	OUTR	O	Right channel audio output.
76	RSEL	I	RF signal polarity selection pin. "H" level: bright level is "H." "L" level: bright level is "L."
77	V_{CC5V}	I	5-V power supply applied to pins for 5-V input.
78	PSEL	I	When IOSEL is "H" level, test pin. Keep this at "L" level. When IOSEL is "L" level, SRDATA input.
79	MSEL	I	When IOSEL is "H" level, frequency selection pin for SMCK pin output. "H" level: SMCK=8.4672 MHz When IOSEL is "L" level, LRCK input. "H" level: left channel data. "L" level: right channel data. SMCK output fixed at 4.2336 MHz.
80	SSEL	I	When IOSEL is "H" level, SUBQ pin output mode selection pin. "H" level: buffered subcode Q mode. "L" level: CLDCK synchronization mode. When IOSEL is "L" level, BCKL input. Buffered subcode Q mode.

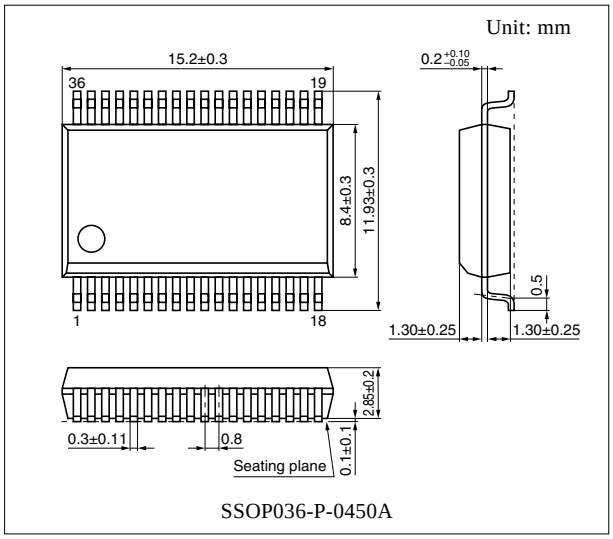
AN8849SB

Head amplifier IC for CD-ROM drive (for 24 times speed or more)

■ Overview

The AN8849SB is a head amplifier IC for digital servo. It can configure an efficient CD-ROM system in combination with the MN662752, and allows a full-automatic adjustment of tracking balance-gain-offset and focus balance-gain-offset with fewer external parts.

Built-in functions are a variable equalizer, wide band RF amp. and AGC which meet CAV playback with 24 times speed or more.



SSOP036-P-0450A

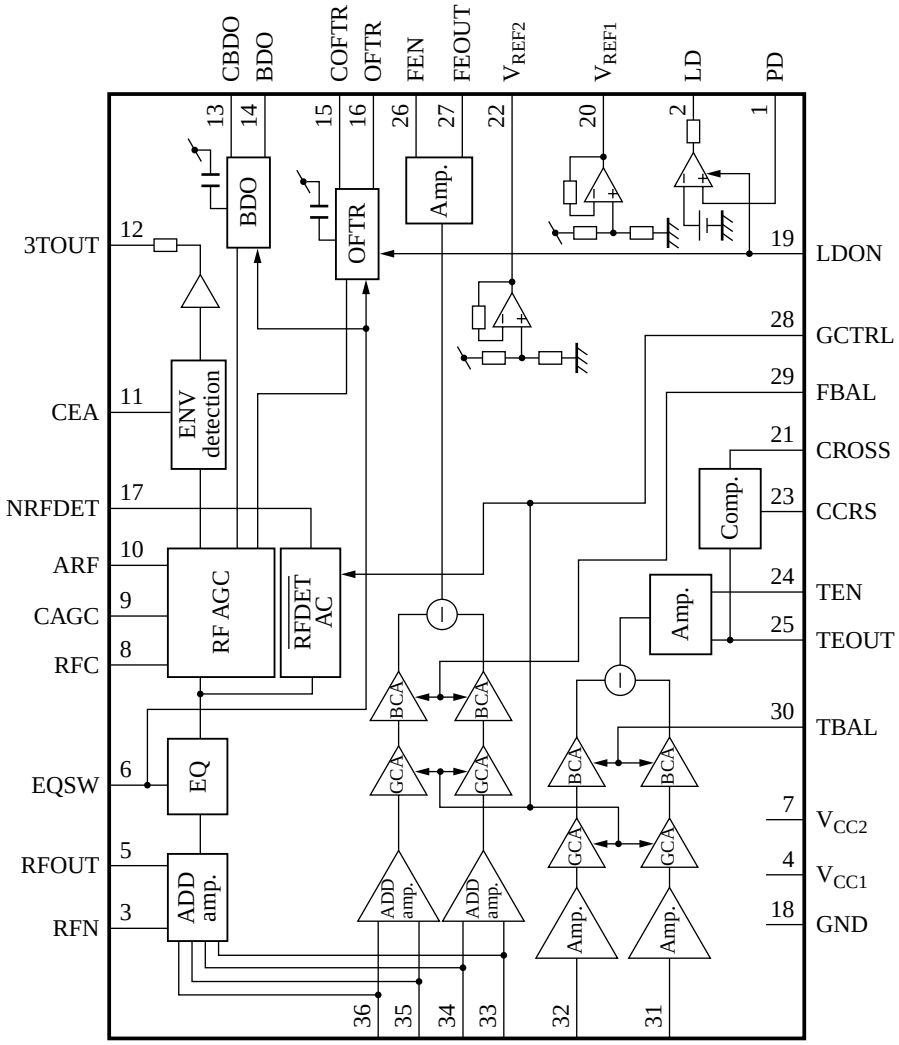
■ Features

- Variable equalizer which meets CAV playback with 24 times speed or more CAV playback.
- Wide band RF amp. and AGC (f_C = 20 MHz or more (–3 dB))
- Balance adjustment function built-in
  Focus error amp./tracking error amp.
- CD-RW playback compatible.
  Variable gain
  Focus error amp./tracking error amp.
  (to +16.9 dB)
- OFTR/BDO detection
- APC amp.

■ Applications

- CD/CD-ROM drive

■ Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	APC amp. input pin	18	GND pin
2	APC amp. output pin	19	APC & masking control pin
3	RF addition amp. inverted input pin	20	V_{REF1} output pin
4	Power supply pin 1	21	CROSS output pin
5	RF addition amp. output pin	22	V_{REF2} output pin
6	EQ characteristics control pin	23	Capacitor connection pin for CROSS
7	Power supply pin 2	24	TE amp. inverted input pin
8	Capacitor connection pin for HPF of AGC input	25	TE amp. output pin
9	AGC loop filter connection pin	26	FE amp. inverted input pin
10	AGC output pin	27	FE amp. output pin
11	Capacitor connection pin for HPF amp.	28	GCTRL pin
12	3TENV output pin	29	FBAL control pin
13	Capacitor connection pin for RF dark-side envelope detection	30	TBAL control pin
		31	Tracking signal input pin 1
14	BDO output pin	32	Tracking signal input pin 2
15	Capacitor connection pin for RF right-side envelope detection	33	Focus signal input pin 4
		34	Focus signal input pin 2
16	OFTR output pin	35	Focus signal input pin 3
17	NRFDET output pin	36	Focus signal input pin 1

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage 1 *1	V_{CC1}	5.8	V
Supply voltage 2 *1	V_{CC2}	5.8	V
Supply current 1 *1	I_{CC1}	55	mA
Supply current 2 *1	I_{CC2}	2.5	mA
Power dissipation *1, *2	P_D	333.5	mW
Operating ambient temperature *1	T_{opr}	–20 to +75	°C
Storage temperature *1	T_{stg}	–55 to +125	°C

Note) ∗1: Except for the power dissipation, operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.
∗2: $P_D = V_{CC1} \cdot I_{CC1} + V_{CC2} \cdot I_{CC2}$

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage 1	V_{CC1}	4.5 to 5.5	V
Supply voltage 2	V_{CC2}	3.0 to 5.5	V

Note) Apply voltage to satisfy $V_{CC2} - V_{CC1} < 0.3$ V.

■ Electrical Characteristics at $T_a = 25°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Current consumption with no load 1	I_{TOTAL1}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{EQSW} = V_{REF2}$ +0.75 V	28.4	40.6	52.8	mA
Current consumption with no load 2	I_{TOTAL2}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	1.20	1.72	2.24	mA
V_{REF1} output voltage	V_{REF1}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	2.27	2.50	2.73	V
V_{REF2} output voltage	V_{REF2}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	1.50	1.65	1.80	V
Focus error amp.						
Focus error amp. output offset voltage	V_{FO-OF}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	–90	0	90	mV
Focus error offset balance crosstalk amount	V_{FO-OFB}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{FB} = V_{REF2}$ ±0.5 V	–150	0	150	mV
Focus error amp. V-V conversion gain	G_{FO}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{GC} = V_{REF2}$ – 0.75 V	12.3	14.4	16.5	dB
Focus error amp. V-V conversion relative gain	ΔG_{FO}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{GC} = V_{REF2}$ – 0.75 V	–1.5	0	1.5	dB
Focus error amp. balance output 1–H	B_{FO1-H}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{FB} = V_{REF2}$ +0.5 V	1.08	1.35	1.62	—
Focus error amp. balance output 1–L	B_{FO1-L}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{FB} = V_{REF2}$ – 0.5 V	0.45	0.65	0.85	—
Focus error amp. balance relative output 2–H	B_{FOH}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{FB} = V_{REF2}$ +0.5 V	4.35	6.35	8.35	dB
Focus error amp. balance relative output 2–L	B_{FOL}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{FB} = V_{REF2}$ – 0.5 V	–8.35	–6.35	–4.35	dB
Focus error amp. frequency characteristics	G_{FOF}	V_{CC1} = 5 V, V_{CC2} = 3.3 V f = 3 kHz, 60 kHz	–4.5	–3.0	–1.5	dB
Focus error amp. GCTRL gain ratio × 4	B_{FO4}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{GC} = V_{REF2}$	3.3	4.3	5.3	—
Tracking error amp.						
Tracking error amp. output offset voltage	V_{TR-OF}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	–60	0	60	mV
Tracking error offset balance crosstalk amount	V_{TR-OFB}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{TB} = V_{REF2}$ ±0.5 V	–200	0	200	mV
Tracking error amp. V–V conversion gain	G_{TR}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{GC} = V_{REF2}$ – 0.75 V	12.2	14.3	16.4	dB
Tracking error amp. V–V conversion relative gain	ΔG_{TR}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{GC} = V_{REF2}$ – 0.75 V	–1.5	0	1.5	dB
Tracking error amp. balance output 1–H	B_{TR1-H}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{TB} = V_{REF2}$ +0.5 V	0.45	0.65	0.85	—
Tracking error amp. balance output 1–L	B_{TR1-L}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{TB} = V_{REF2}$ – 0.5 V	1.08	1.35	1.62	—

■ Electrical Characteristics at $T_a = 25°C$ (continue)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Tracking error amp. (continued)						
Tracking error amp. balance relative output 2–H	B_{TRH}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{TB} = V_{REF2}$ +0.5 V	−8.35	−6.35	−4.35	dB
Tracking error amp. balance relative output 2–L	B_{TRL}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{TB} = V_{REF2}$ − 0.5 V	4.35	6.35	8.35	dB
Tracking error amp. frequency characteristics	G_{TRF}	V_{CC1} = 5 V, V_{CC2} = 3.3 V f = 30 kHz, 500 kHz	−4.5	—	0	dB
Tracking error amp. GCTRL gain ratio × 4	B_{TR4}	V_{CC1} = 5 V, V_{CC2} = 3.3 V $V_{GC} = V_{REF2}$	3.3	4.3	5.3	—
CROSS detection						
CROSS high-level output	V_{CR-H}	V_{CC1} = 5 V, V_{CC2} = 3.3 V, f = 10 kHz	4.2	—	—	V
CROSS low-level output	V_{CR-L}	V_{CC1} = 5 V, V_{CC2} = 3.3 V, f = 10 kHz	—	—	0.8	V
RF addition amp.						
RF addition amp. output offset voltage	V_{RAOF}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	−200	0	200	mV
RF addition amp. addition gain	G_{RAD}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	−2.1	0	2.1	dB
RF addition amp. addition relative gain 1	ΔG_{RAD1}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	−1.0	0	1.0	dB
RF addition amp. addition relative gain 2	ΔG_{RAD2}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	−1.0	0	1.0	dB
RF addition amp. addition relative gain 3	ΔG_{RAD3}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	−1.0	0	1.0	dB
RF addition amp. full-addition gain	G_{RADA}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	9.9	12.0	14.1	dB
RF addition amp. full-addition frequency characteristics *	G_{RADDF}	V_{CC1} = 5 V, V_{CC2} = 3.3 V f = 500 kHz, 30 MHz	−3.1	−1.6	1.4	dB
Variable EQ characteristics						
EQ characteristics × 1–1 *	G_{EQ1-1}	f = 100 kHz EQSW = V_{REF2} − 0.5 V	−1.5	0	1.5	dB
EQ characteristics × 1–3 *	G_{EQ1-3}	f = 500 kHz EQSW = V_{REF2} − 0.5 V	0.5	2.0	3.5	dB
EQ characteristics × 20–1 *	G_{EQ20-1}	EQSW = V_{REF2} +0.5 V f = 2 MHz	−1.5	0	1.5	dB
EQ characteristics × 20–3 *	G_{EQ20-3}	EQSW = V_{REF2} +0.5 V f = 13 MHz	−1.3	0.2	1.7	dB
AGC						
AGC max. gain	G_{MAGC}	f = 500 kHz, V_{IN} = 20 mV[p-p]	20.3	23.3	26.3	dB
AGC operating gain	G_{AGC}	f = 500 kHz, V_{IN} = 500 mV[p-p]	3.0	6.0	9.0	dB
AGC compression factor	ΔG_{AGC}	f = 500 kHz, V_{IN} = 125 mV[p-p]	−1.20	1.30	3.80	dB
AGC frequency characteristics	G_{FAGC}	f = 30 MHz, V_{IN} = 20 mV[p-p]	−4.5	−3.0	0	dB

Note) ∗: The values mentioned above are subject to change according to the state of a printed circuit board, a socket, etc.

■ Electrical Characteristics at T_a = 25°C (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
NRF detection						
NRF det. detection level	V_{RDA1}	f = 500 kHz, $V_{GC} = V_{REF2} - 0.75$ V	73	105	137	mV[p-p]
NRF det. high-level output voltage	V_{RDAH}	f = 500 kHz, $V_{GC} = V_{REF2} - 0.75$ V	4.2	—	—	V
NRF det. low-level output voltage	V_{RDAL}	f = 500 kHz, $V_{GC} = V_{REF2} - 0.75$ V	—	—	0.8	V
NRF det. detection level ratio	B_{RDA}	f = 500 kHz, $V_{GC} = V_{REF2}$	2.9	3.9	4.9	—
BDO						
CBDO detection current	I_{BDO}	V_{CC1} = 5 V, V_{CC2} = 3.3 V EQSW = $V_{REF2} - 0.5$ V	0.98	1.40	1.82	µA
CBDO detection current ratio	B_{IBD4}	V_{CC1} = 5 V, V_{CC2} = 3.3 V EQSW = V_{REF2}	3.0	3.8	4.6	—
BDO high-level output voltage	V_{BDOH}	V_{CC1} = 5 V, V_{CC2} = 3.3 V f = 5 kHz, rectangular wave	4.2	—	—	V
BDO low-level output voltage	V_{BDOL}	V_{CC1} = 5 V, V_{CC2} = 3.3 V f = 5 kHz, rectangular wave	—	—	0.8	V
OFTR						
COFTR detection current	I_{OFTR}	V_{CC1} = 5 V, V_{CC2} = 3.3 V EQSW = $V_{REF2} - 0.5$ V	0.98	1.40	1.82	µA
COFTR detection current ratio	B_{IOFTR4}	V_{CC1} = 5 V, V_{CC2} = 3.3 V EQSW = V_{REF2}	3.0	3.8	4.6	—
OFTR high-level output voltage	V_{OFTRH}	V_{CC1} = 5 V, V_{CC2} = 3.3 V f = 5 kHz, rectangular wave	4.2	—	—	V
OFTR low-level output voltage	V_{OFTRL}	V_{CC1} = 5 V, V_{CC2} = 3.3 V f = 5 kHz, rectangular wave	—	—	0.8	V
Masking operating voltage 1	V_{MASK1}	f = 40 kHz, V_{IN} = 100 mV[p-p]	—	—	0.35	V
Masking operating voltage 2	V_{MASK2}	f = 40 kHz, V_{IN} = 100 mV[p-p]	0.65	—	—	V
3TENV						
CEA to ENV transfer characteristics	$G_{CEA-ENV}$	V_{CC1} = 5 V, V_{CC2} = 3.3 V	20.0	23.0	26.0	dB
CEA input impedance	Z_{CEA}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	6.8	8.8	10.8	kΩ
ENV amp. output impedance	Z_{ENV}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	6.4	8.4	10.4	kΩ
ENV amp. offset voltage	V_{ENVOF}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	–100	0	100	mV
ENV amp. operation	V_{ENV}	V_{CC1} = 5 V, V_{CC2} = 3.3 V f = 800 kHz, AM modulation	270	540	810	mV[p-p]
LD APC						
LD operating reference voltage	V_{LD}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	135	170	205	mV
LDON operating voltage	V_{LDON}	V_{CC1} = 5 V, V_{CC2} = 3.3 V	—	—	– 0.35	V

AN8814SB

4-channel driver IC for optical disk drive

■ Overview

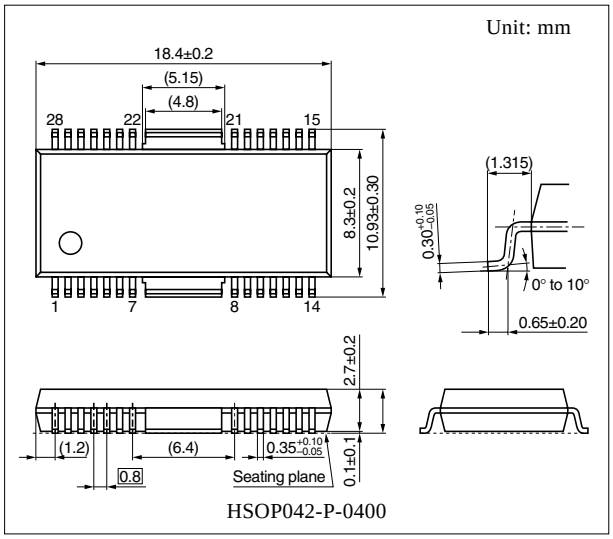
The AN8814SB is a BTL system 4-channel driver and is encapsulated in the SMD package which excels in heat radiation characteristic.

■ Features

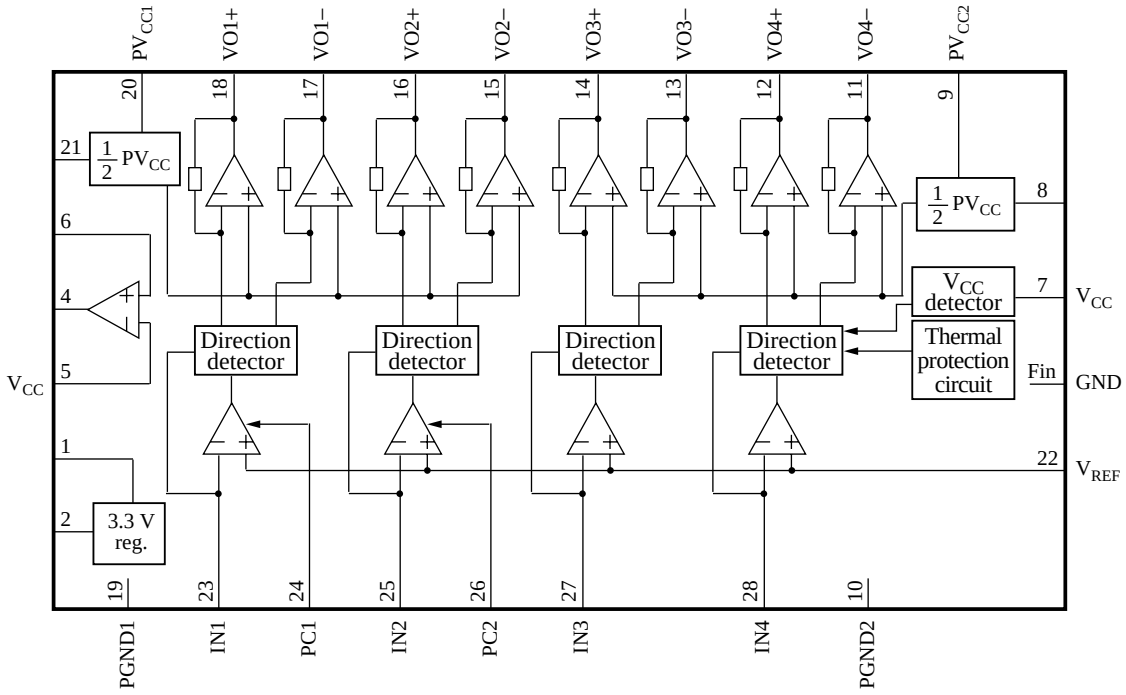
- Wide output dynamic range regardless of reference voltage of the system
- Driver I/O gain setting is possible with an additional external resistor
- 3.3 V supply voltage is available due to an external PNP-tr.
- Additional OP-amp. built-in

■ Applications

- MD, CD/CD-ROM drive
- DVD/DVD-ROM drive



■ Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Base control pin for an external transistor of 3.3 V regulator	15	Motor driver-2 reverse rotation output pin
		16	Motor driver-2 forward rotation output pin
2	3.3 V regulator output monitor pin	17	Motor driver-1 reverse rotation output pin
3	N.C. pin	18	Motor driver-1 forward rotation output pin
4	Op-amp. output pin	19	Driver GND pin 1
5	Op-amp. inverted input pin	20	Driver power supply pin 1
6	Op-amp. non-inverted input pin	21	1/2 PV_{CC} output pin 1
7	Power supply pin	22	V_{REF} input pin
8	1/2 PV_{CC} output pin 2	23	Motor driver-1 input pin
9	Driver power supply pin 2	24	PC (power cut) input pin 1
10	Driver GND pin 2	25	Motor driver-2 input pin
11	Motor driver-4 reverse rotation output pin	26	PC (power cut) input pin 2
12	Motor driver-4 forward rotation output pin	27	Motor driver-3 input pin
13	Motor driver-3 reverse rotation output pin	28	Motor driver-4 input pin
14	Motor driver-3 forward rotation output pin	Fin	GND pin

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	SV_{CC}	17	V
Supply current	I_{CC}	—	mA
Power dissipation *2	P_D	542	mW
Operating ambient temperature *1	T_{opr}	–30 to +85	°C
Storage temperature *1	T_{stg}	–55 to +150	°C

Note) ∗1: Except for the operating ambient temperature and storage temperature, all ratings are for T_a = 25°C.

∗2: T_a = 85°C.

Referring to "■ Application Circuit Example", following the allowable power dissipation characteristic curve of "■ Application Notes".

■ Recommended Operating Range

Parameter	Symbol	Range	Unit
Supply voltage	SV_{CC} , PV_{CC1} , PV_{CC2}	4.0 to 14	V

■ Electrical Characteristics at $T_a = 25°C$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Current consumption with no load	I_{TOT}	$V_{CC} = 5$ V	5	10	15	mA
Motor driver 1 to motor driver 4						
Input offset voltage	V_{IOF}	$V_{CC} = 5$ V, $V_{PC1} = V_{PC2} = 0$ V, R_{L1} to $R_{L4} = 8$ kΩ, R_1 to $R_4 = 10$ kΩ	−10	0	10	mV
Output offset voltage	V_{OOF}	$V_{CC} = 5$ V, $V_{PC1} = V_{PC2} = 0$ V, R_{L1} to $R_{L4} = 8$ kΩ, R_1 to $R_4 = 10$ kΩ	−50	0	50	mV
Gain	G	$V_{CC} = 5$ V, $V_{PC1} = V_{PC2} = 0$ V, R_{L1} to $R_{L4} = 8$ kΩ, R_1 to $R_4 = 10$ kΩ	18.0	20.0	22.0	dB
Maximum output amplitude (+)	V_{L+}	$V_{CC} = 5$ V, $V_{PC1} = V_{PC2} = 0$ V, R_{L1} to $R_{L4} = 8$ kΩ, R_1 to $R_4 = 10$ kΩ	2.4	2.7	—	V
Maximum output amplitude (−)	V_{L-}	$V_{CC} = 5$ V, $V_{PC1} = V_{PC2} = 0$ V, R_{L1} to $R_{L4} = 8$ kΩ, R_1 to $R_4 = 10$ kΩ	—	−2.7	−2.4	V
Motor driver 1						
High-level threshold voltage	V_{PCH1}	$V_{CC} = 5$ V, $R_{L1} = 8$ Ω, $R_1 = 10$ kΩ	2.0	—	—	V
Low-level threshold voltage	V_{PCL1}	$V_{CC} = 5$ V, $R_{L1} = 8$ Ω, $R_1 = 10$ kΩ	—	—	0.5	V
Motor driver 2						
High-level threshold voltage	V_{PCH2}	$V_{CC} = 5$ V, $R_{L2} = 8$ Ω, $R_2 = 10$ kΩ	2.0	—	—	V
Low-level threshold voltage	V_{PCL2}	$V_{CC} = 5$ V, $R_{L2} = 8$ Ω, $R_2 = 10$ kΩ	—	—	0.5	V
Reset circuit						
Reset operation release supply voltage	V_{RST}	$I_{IN} = 10$ μA, R_1 to $R_4 = 10$ kΩ	2.1	2.3	2.5	V
3.3 V regulator						
Output voltage	V_{REG}	$V_{CC} = 5$ V	3.1	3.3	3.5	V
Output load fluctuation	ΔV_R	$V_{CC} = 5$ V	−50	0	50	mV
Supply voltage fluctuation	ΔV_V	$V_{CC} = 5$ V/12 V	−5	0	5	mV
Op-amp.						
Input offset voltage	V_{OF}	$V_{CC} = 5$ V	−10	0	10	mV
Input bias current	I_{BOP}	$V_{CC} = 5$ V	—	150	500	nA
High-level output voltage	V_{OH}	$V_{CC} = 5$ V	4.0	—	—	V
Low-level output voltage	V_{OL}	$V_{CC} = 5$ V	—	—	1.5	V
Output driving current sink	I_{SIN}	$V_{CC} = 5$ V	2.0	—	—	mA
Output driving current source	I_{SOU}	$V_{CC} = 5$ V	2.0	—	—	mA

■ Electrical Characteristics at $T_a = 25°C$ (continued)

• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

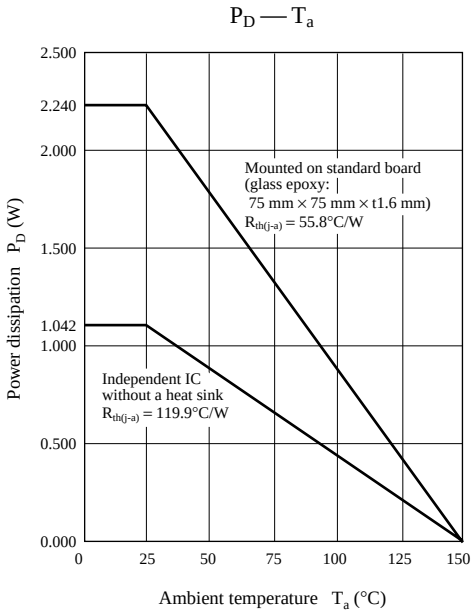
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Thermal protection circuit						
Operating temperature equilibrium value	T_{THD}		—	180	—	°C
Operating temperature hysteresis width	ΔT_{THD}		—	45	—	°C

■ Usage Notes

1. Avoid the short-circuits between output and V_{CC} , and between output pin and GND. Otherwise, the IC is likely to break down or emit smoke.
2. An appropriate prior study should be done for use of dip soldering.

■ Application Notes

• P_D — T_a curves of HSOP042-P-0400



BURR - BROWN®

HDCD®

For most current data sheet and other product information, visit www.burr-brown.com

PCM1732

SoundPLUS™ 24-Bit, 96kHz, Stereo Audio DIGITAL-TO-ANALOG CONVERTER With HDCD® Decoder

FEATURES

- ENHANCED MULTI-LEVEL ΔΣ DAC
- INPUT AUDIO DATA WORD: 16-, 20-, 24-Bit
- SAMPLING FREQUENCY (f_S): 16kHz - 96kHz
- SYSTEM CLOCK: 256, 384, 512, 768f_S
- HIGH PERFORMANCE:
  THD+N: –96dB
  Dynamic Range: 104dB
  SNR: 104dB
- AUDIO OUTPUT LEVEL: 0.57 x V_{CC} (Vp-p)
- 8x OVERSAMPLING DIGITAL FILTER WITH HDCD DECODER:
  Stopband Attenuation: –120dB
  Passband Ripple: ±0.00001dB
  HDCD Filter Optimized for 44.1kHz to 48kHz and 88.2kHz to 96kHz
- MULTI-FUNCTIONS:
  Digital De-emphasis
  Soft Mute
  Digital Attenuation
  Zero Detect
  Digital Gain Scaling
  Reversible Output Phase
- +5V SINGLE-SUPPLY OPERATION
- SMALL SO-28 PACKAGE

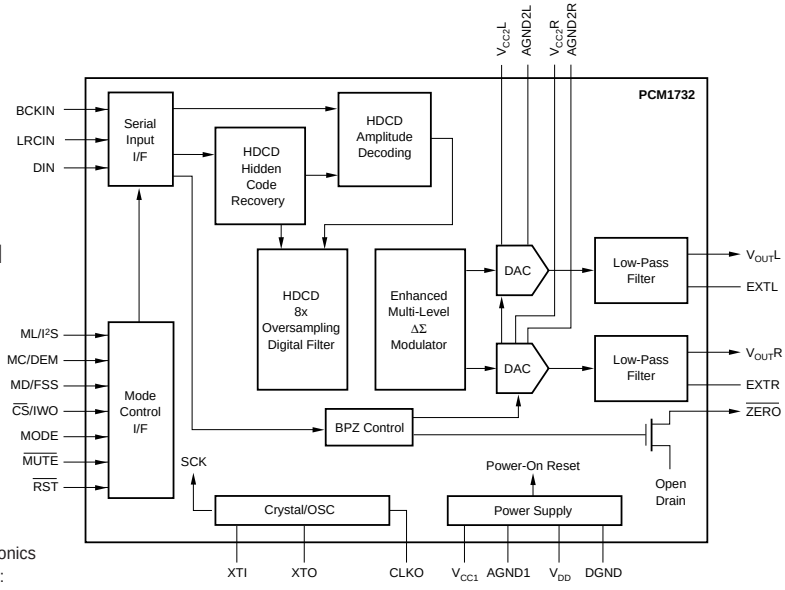
NOTE: An HDCD license from Pacific Microsonics, Inc. is required to purchase the PCM1732.

DESCRIPTION

The PCM1732 is designed for mid- to high-grade digital audio applications which achieve 96kHz sampling rates with 24-bit audio data, such as High Definition Compatible Digital (HDCD) CD players, DVD players, mini-disc players and AV receivers.

PCM1732 uses a newly-developed “enhanced, multi-level delta-sigma modulator” architecture that improves audio dynamic performance and reduces jitter sensitivity.

The internal digital filter operates at 8x oversampling at a 96kHz sampling rate, with –120dB stopband attenuation.



HDCD® is a registered trademark of Pacific Microsonics, Inc.

HDCD® technology is provided under license from Pacific Microsonics Inc. The PCM1732's design is covered by the following patents:
In the USA: 45,479,168, 5,638,074, 5,640,161, 5,808,574, 5,838,274 5,854,600, 5,864,311, 5,872,531.
In Australia: 669,114.
Other patents pending.

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Twx: 910-952-1111 • Internet: http://www.burr-brown.com/ • Cable: BBRCORP • Telex: 066-6491 • FAX: (520) 889-1510 • Immediate Product Info: (800) 548-6132

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SPECIFICATIONS

24-Bit Data Performance

All specifications at +25°C, $+V_{CC}$ = $+V_{DD}$ = +5V, f_S = 44.1kHz, and SYSCLK = 384f_S, unless otherwise noted.

PARAMETER	CONDITIONS	PCM1732 MIN	PCM1732 TYP	PCM1732 MAX	UNITS
RESOLUTION		24		Bits	
DATA FORMAT					
Audio Data Interface Format			Standard/I²S		
Data Bit Length			16/20/24 Selectable		
Audio Data Format			MSB-First, Binary Two's Complement		
Sampling Frequency (f_S)		16		96	kHz
System Clock Frequency[1]			256/384/512/768f_S		
System Clock Duty Cycle		40		60	%
DIGITAL INPUT/OUTPUT LOGIC LEVEL					
Input Logic Level (except XTI): V_{IH}		2.0			V
V_{IL}				0.8	V
Output Logic Level (CLKO): V_{OH}	I_{OH} = 2mA	4.5			V
V_{OL}	I_{OL} = 4mA			0.5	V
CLKO PERFORMANCE[2]					
Output Rise Time	20 ~ 80% V_{DD}, 10pF		5.5		ns
Output Fall Time	80 ~ 20% V_{DD}, 10pF		4		ns
Output Duty Cycle	10pF Load		30		%
DYNAMIC PERFORMANCE[3, 4]					
THD+N V_O = 0dB	f_S = 44.1kHz		–96	–90	dB
	f_S = 96kHz		–94		dB
V_O = –60dB	f_S = 44.1kHz		–42		dB
Dynamic Range	f_S = 44.1kHz, EIAJ A-weighted	98	104		dB
	f_S = 96kHz, A-weighted		103		dB
Signal-to-Noise Ratio[5]	f_S = 44.1kHz, EIAJ A-weighted	98	104		dB
	f_S = 96kHz, A-weighted		103		dB
Channel Separation	f_S = 44.1kHz	96	104		dB
	f_S = 96kHz		101		dB
DC ACCURACY					
Gain Error			±1.0	±3.0	% of FSR
Gain Mismatch Channel-to-Channel			±1.0	±3.0	% of FSR
Bipolar Zero Error	V_O = 0.5V_{CC} at Bipolar Zero		±30	±60	mV
ANALOG OUTPUT					
Output Voltage[6]	Full Scale (0dB)		0.57 V_{CC}		Vp-p
Center Voltage			0.5 V_{CC}		V
Load Impedance	AC Load	5			kΩ
DIGITAL FILTER PERFORMANCE					
Filter Characteristics 1					
(f_S = 44.1kHz/48kHz optimal)					
Passband	±0.002dB			0.471f_S	
	–3dB			0.487f_S	
Stopband		0.515f_S			
Passband Ripple	< 0.453f_S			±0.0001	dB
Stopband Attenuation	Stopband = 0.515f_S	–109			dB
	Stopband = 0.520f_S	–123			dB
Delay Time			81/f_S		sec
Filter Characteristics 2					
(f_S = 88.2kHz/96kHz optimal)					
Passband	±0.005dB			0.395f_S	
	–3dB			0.441f_S	
Stopband		0.538f_S			
Passband Ripple	< 0.341f_S			±0.0001	dB
Stopband Attenuation	Stopband = 0.538f_S	–132			dB
Delay Time			31/f_S		sec
De-Emphasis Error				±0.1	dB
INTERNAL ANALOG FILTER					
–3dB Bandwidth			100		kHz
Passband Response	f = 20kHz		–0.16		dB
POWER SUPPLY REQUIREMENTS					
Voltage Range	V_{DD}, V_{CC}	4.5	5	5.5	VDC
Supply Current: I_{CC} + I_{DD}	f_S = 44.1kHz		35	105	mA
	f_S = 96kHz		93		mA
Power Dissipation	f_S = 44.1kHz		425	525	mW
	f_S = 96kHz		465		mW
TEMPERATURE RANGE					
Operating		–25		+70	°C
Storage		–55		+100	°C
Thermal Resistance, θ_{JA}			67		°C/W

NOTES: (1) Refer to the System Clock section of this data sheet. (2) An external buffer is recommended. (3) Dynamic performance specifications are tested with 20kHz low-pass filter and THD+N specifications are tested with 30kHz LPF, 400Hz HPF, Average Mode. (4) Dynamic performance specifications are tested with HDCD gain scaling set to analog gain scaling. (5) SNR is tested with infinite zero detection off. (6) Output level is for sine wave. DAC outputs 0.64 V_{CC} (peak-to-peak) due to filter response as transient.

SPECIFICATIONS

16-Bit Data Performance

All specifications at +25°C, $+V_{DD}$ = $+V_{CC}$ = +5V, f_S = 44.1kHz, and SYSCLK = 384f_S, unless otherwise noted. For discussion of HDCD scaling options, see the Applications Considerations section of this data sheet.

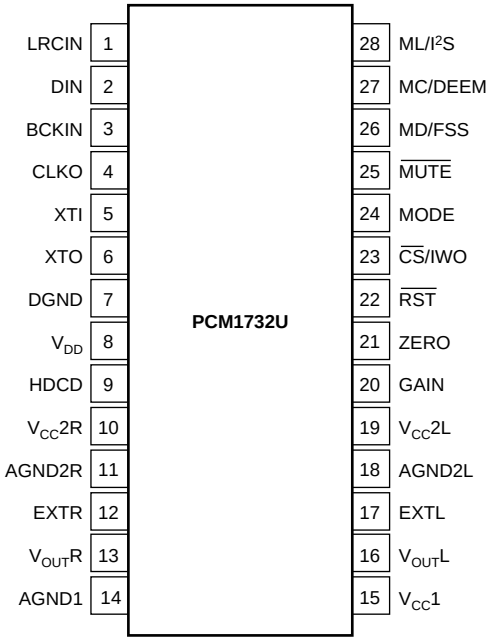
PARAMETER	CONDITIONS	PCM1732U MIN	PCM1732U TYP	PCM1732U MAX	UNITS
DYNAMIC ANALOG PERFORMANCE, STANDARD CD, ANALOG HDCD SCALING(1)					
Total Harmonic Distortion + Noise					
V_O = 0dB	0dBFS		–95		dB
V_O = –60dB			–37		dB
Dynamic Range	EIAJ A-Weighted		99		dB
Output Voltage, Sine Wave	0dBFS(2)		0.57V_{CC}		Vp-p
DYNAMIC ANALOG PERFORMANCE, HDCD CD, ANALOG HDCD SCALING(3)					
Total Harmonic Distortion + Noise					
V_O = 0dB	0dBFS		–94		dB
V_O = –60dB			–38		dB
Dynamic Range	EIAJ A-Weighted(4)		104		dB
Output Voltage, Sine Wave	0dBFS, Without Peak Extend(2)		0.57V_{CC}		Vp-p
	0dBFS, With Peak Extend(5)		0.285V_{CC}		Vp-p
	+6dBFS(5, 6)		0.57V_{CC}		Vp-p
DYNAMIC ANALOG PERFORMANCE, Standard CD, Digital HDCD SCALING(1)					
Total Harmonic Distortion + Noise					
V_O = 0dB	0dBFS		–92		dB
V_O = –60dB			–33		dB
Dynamic Range	EIAJ A-Weighted		96		dB
Output Voltage, Sine Wave	0dBFS		0.285V_{CC}		Vp-p
DYNAMIC ANALOG PERFORMANCE HDCD CD, Digital HDCD SCALING(2)					
Total Harmonic Distortion + Noise					
V_O = 0dB	0dBFS		–91		dB
V_O = –60dB			–34		dB
Dynamic Range	EIAJ A-Weighted(4)		104		dB
Output Voltage, Sine Wave	0dBFS		0.285V_{CC}		Vp-p
	+6dBFS(5)		0.57V_{CC}		Vp-p

NOTES: (1) Without dither. (2) Gain pin is LOW. (3) With the rectangular PDF dither. (4) Including Peak Extend to +6dBFS. (5) Gain pin is HIGH. (6) +6dBFS is the full Peak Extend, while dynamic range numbers are with Peak Extend.

The information provided herein is believed to be reliable; however, BURR-BROWN assumes no responsibility for inaccuracies or omissions. BURR-BROWN assumes no responsibility for the use of this information, and all use of such information shall be entirely at the user's own risk. Prices and specifications are subject to change without notice. No patent rights or licenses to any of the circuits described herein are implied or granted to any third party. BURR-BROWN does not authorize or warrant any BURR-BROWN product for use in life support devices and/or systems.

PIN CONFIGURATION

Top View SO-28



PIN ASSIGNMENTS

PIN	NAME	I/O	DESCRIPTION
1	LRCIN	IN	Left and Right Clock Input. This clock is equal to the sampling rate, f_S.(1)
2	DIN	IN	Serial Audio Data Input(1)
3	BCKIN	IN	Bit Clock Input for Serial Audio Data(1)
4	CLKO	OUT	Buffered System Clock Output.
5	XTI	IN	Oscillator Input/External Clock Input(2)
6	XTO	OUT	Oscillator Output
7	DGND	—	Digital Ground
8	V_{DD}	—	Digital Power +5V
9	HDCD	OUT	HDCD Encoded Data Detect
10	V_{CC}2R	—	Analog Power +5V, Rch
11	AGND2R	—	Analog Ground, Rch
12	EXTR	—	Common Mode Voltage for Analog Output Amp, Rch
13	V_{OUT}R	OUT	Analog Voltage Output, Rch
14	AGND1	—	Analog Ground
15	V_{CC}1	—	Analog Power +5V
16	V_{OUT}L	OUT	Analog Voltage Output, Lch
17	EXTL	—	Common Mode Voltage for Analog Output Amp, Lch
18	AGND2L	OUT	Analog Ground, Lch
19	V_{CC}2L	—	Analog Power +5V, Lch
20	GAIN	OUT	External (analog) Gain Scaling
21	$\overline{\text{ZERO}}$	OUT	Zero Data Flag
22	$\overline{\text{RST}}$	IN	Reset. When this pin is LOW, the digital filter and modulators are held in reset.(3)
23	$\overline{\text{CS}}$/IW0	IN	Chip Select/Input Format Selection. When this pin is LOW, the Mode Control interface is enabled.(4)
24	MODE	IN	Mode Control Select: H = Software; L = Hardware(3)
25	$\overline{\text{MUTE}}$	IN	Mute Control(3)
26	MD/FSS	IN	Mode Data/Sampling Rate Range Select(3)
27	MC/DEM	IN	Mode Clock/De-Emphasis Select(3)
28	ML/I2S	IN	Mode Latch/Input Format Select(3)

NOTES: (1) Schmitt Trigger input. (2) CMOS logic level input. (3) Schmitt Trigger input with pull-up resister. (4) Schmitt Trigger input with pull-down resistor.

ABSOLUTE MAXIMUM RATINGS

Power Supply Voltage	+6.5V
$+V_{CC}$ to $+V_{DD}$ Difference	±0.1V
Input Logic Voltage	–0.3V to (V_{DD} + 0.3V)
Input Current (except power supply)	±10mA
Power Dissipation	750mW
Operating Temperature Range	–25°C to +70°C
Storage Temperature	–55°C to +125°C
Lead Temperature (soldering, 5s)	+260°C
(reflow, 10s)	+235°C

PACKAGE/ORDERING INFORMATION

PRODUCT	PACKAGE	PACKAGE DRAWING NUMBER(1)	SPECIFIED TEMPERATURE RANGE	PACKAGE MARKING	ORDERING NUMBER(2)	TRANSPORT MEDIA
PCM1732U	SO-28	217	–25°C to +70°C	PCM1732U	PCM1732U	Rails
"	"	"	"	"	PCM1732U/1K	Tape and Reel

NOTES: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book. (2) Models with a slash (/) are available only in Tape and Reel in the quantities indicated (e.g., /1K indicates 1000 devices per reel). Ordering 1000 pieces of "PCM1732U/1K" will get a single 1000-piece Tape and Reel. For detailed Tape and Reel mechanical information, refer to Appendix B of Burr-Brown IC Data Book.

ELECTROSTATIC DISCHARGE SENSITIVITY

This integrated circuit can be damaged by ESD. Burr-Brown recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

MCU Pin Arrangement and Functions

Pin Arrangement

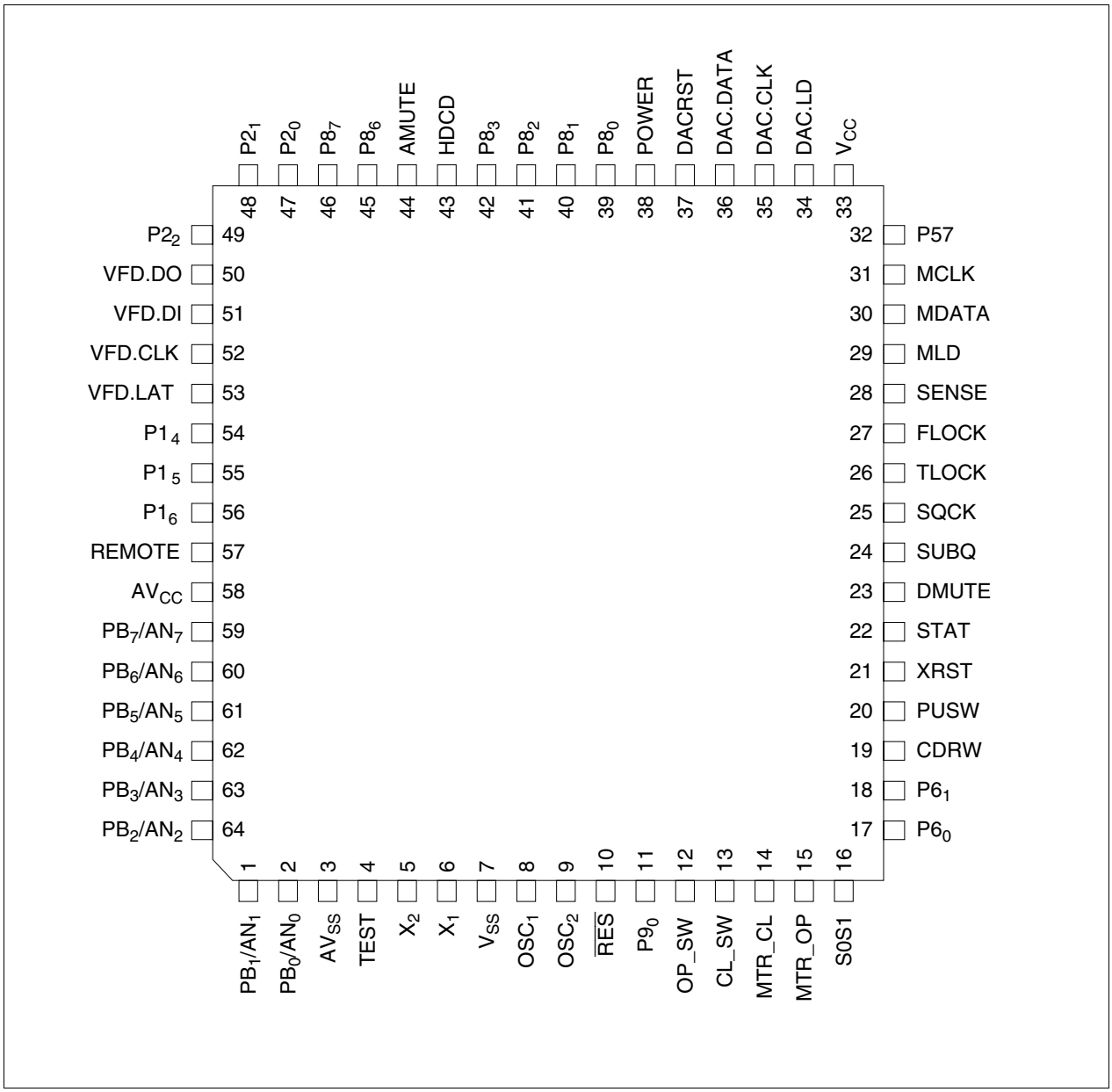


Figure 1.2 Pin Arrangement

Internal Block Diagram

Figure 1.1 shows a block diagram.

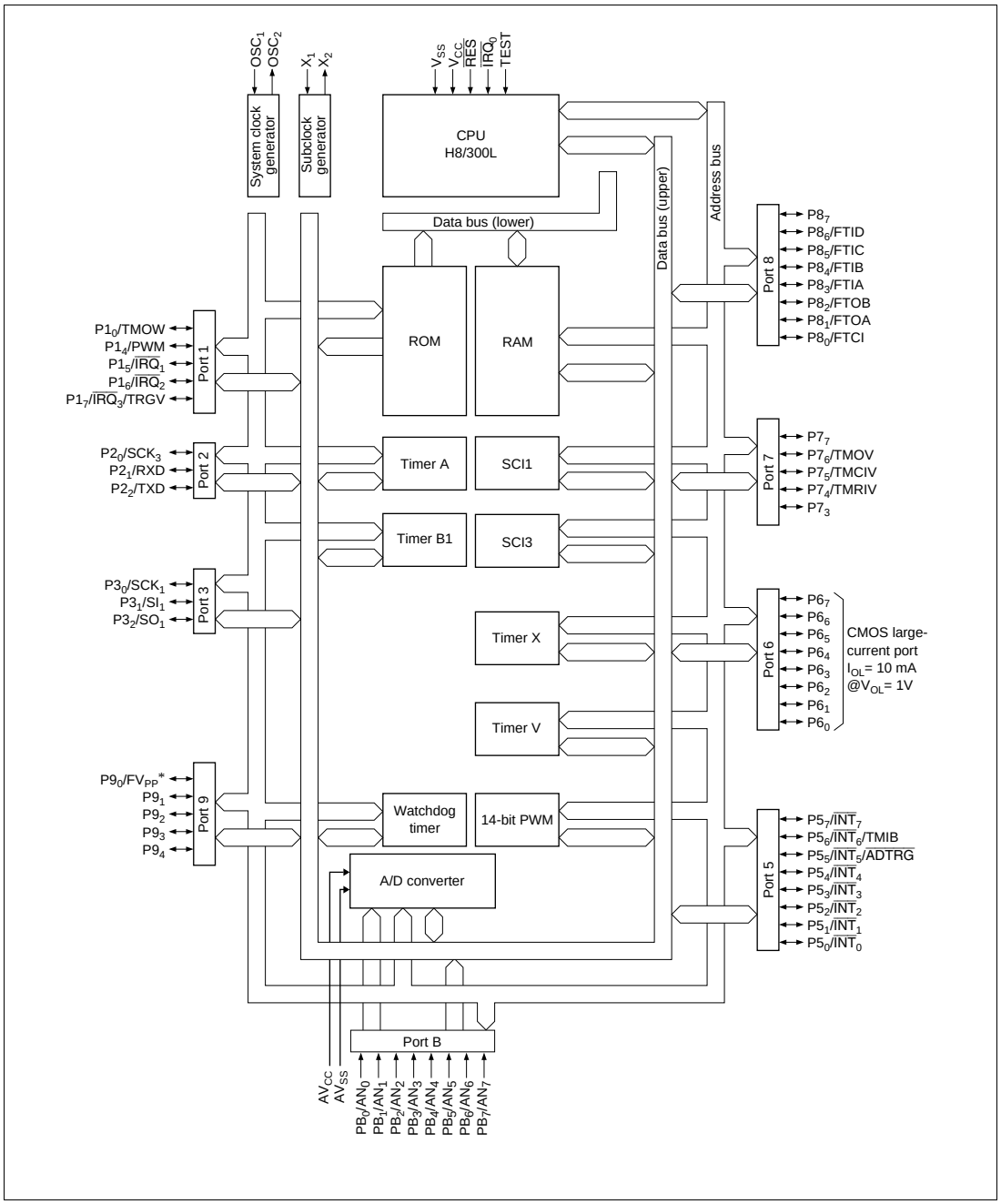


Figure 1.1 Block Diagram

HITACHI

Pin Functions

Pin	Name	Description
1	PB1	No connection
2	PB0	No connection
3	AVSS	Connected 0V
4	TEST	Connected 0V
5	X2	No connection
6	X1	Connected 5V
7	VSS	MCU ground line; connected to 0V
8	OSC1	10MHz crystal input
9	OSC2	10MHz crystal input
10	RES	MCU reset line; 0V = reset; 5V = normal operation
11	P90	No connection
12	OP_SW	CD door open position switch; 0V=door open
13	CL_SW	CD door close position switch; 0V=door close
14	MTR_CL	CD door close motor control line
15	MTR_OP	CD door open motor control line
16	S0S1	CD DSP SUBQ ready input; high pulse for SUBQ ready
17	P60	No connection
18	P61	No connection
19	CDRW	CDRW RF gain control; 0V=CDRW
20	PUSW	Laser pickup inner switch; 5V=pickup at inner position
21	XRST	CD DSP reset line; 0V = DSP reset
22	STAT	CD DSP internal status output
23	DMUTE	CD DSP mute control; 5V = mute on
24	SUBQ	SUBQ output
25	SQCK	SUBQ output serial clock
26	TLOCK	CD DSP track lock status; 0V = locked
27	FLOCK	CD DSP focus lock status; 0V = locked
28	SENSE	CD DSP internal status
29	MLD	CD DSP command latch
30	MDATA	CD DSP serial command data
31	MCLK	CD DSP serial command clock
32	P57	No connection
33	VCC	MCU power supply; connected to 5V
34	DAC.LD	PCM1732 serial command latch
35	DAC.CLK	PCM1732 serial command clock
36	DAC.DATA	PCM1732 serial command data
37	DACRST	PCM1732 reset pin; 0V = reset
38	POWER	Servo power on/off control; 5V = power on
39	P80	No connection
40	P81	No connection
41	P82	No connection
42	P83	No connection
43	HDCD	HDCD decoding status from PCM1732; 5V = HDCD

44	AMUTE	System mute control; 0V = mute
45	P86	No connection
46	P87	No connection
47	P20	No connection
48	P21	No connection
49	P22	No connection
50	VFD.DO	Display driver status serial data
51	VFD.DI	Display driver command serial data
52	VFD.CLK	Display driver command serial clock
53	VFD.LAT	Display driver command serial latch
54	P14	No connection
55	P15	No connection
56	P16	CD DSP internal status for auto-adjustment
57	REMOTE	IR remote signal input
58	AVCC	Connected to 5V
59	PB7	No connection
60	PB6	No connection
61	PB5	No connection
62	PB4	No connection
63	PB3	No connection
64	PB2	No connection

PNP/NPN Epitaxial Planar Silicon Transistors

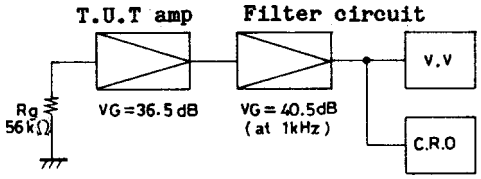
2SA1391/2SC3382

Low Noise AF Amp Applications

Features

- Adoption of FBET process.
- AF amp.
- Low-noise use.

Noise Test Circuit



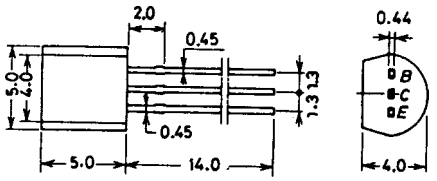
( ) : 2SA1391

Package Dimensions

unit:mm

2003A

[2SA1391/2SC3382]



JEDEC : TO-92
EIAJ : SC-43
SANYO : NP

B : Base
C : Collector
E : Emitter

Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(–)60	V
Collector-to-Emitter Voltage	V_{CEO}		(–)50	V
Emitter-to-Base Voltage	V_{EBO}		(–)6	V
Collector Current	I_C		(–)200	mA
Collector Current (Pulse)	I_{CP}		(–)400	mA
Collector Dissipation	P_C		400	mW
Junction Temperature	Tj		150	˚C
Storage Temperature	Tstg		–55 to +150	˚C

Electrical Characteristics at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=(–)40V, I_E=0			(–)0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(–)5V, I_C=0			(–)0.1	μA
DC Current Gain	$h_{FE}1$	V_{CE}=(–)6V, I_C=(–)1mA	100*		560*	
	$h_{FE}2$	V_{CE}=(–)6V, I_C=(–)0.1mA	70			
Gain-Bandwidth Product	f_T	V_{CE}=(–)6V, I_C=(–)10mA		250		MHz
				(200)		MHz
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=(–)100mA, I_B=(–)10mA			(–)0.3	V
Base-to-Emitter Saturation Voltage	$V_{BE(sat)}$	I_C=(–)100mA, I_B=(–)10mA			(–)1.0	V
Output Capacitance	C_{ob}	V_{CB}=(–)6V, f=1MHz		2.7		pF
				(3.7)		pF
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)10μA, I_E=0	(–)60			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(–)1mA, R_{BE}=∞	(–)50			V
Emitter-to-Base Breakdown Votage	$V_{(BR)EBO}$	I_E=(–)10μA, I_C=0	(–)6			V
Noise Level	$V_{NO(ave)}$	V_{CC}=(–)30V, I_C=(–)1mA, R_g=56kΩ, V_G=77dB/1kHz			40	mV
					35	mV
Noise Peak Level	$V_{NO(peak)}$	V_{CC}=(–)30V, I_C=(–)1mA, R_g=56kΩ, V_G=77dB/1kHz			280	mV
					(200)	mV

* : 2SA1391/2SC3382 are classified by 1mA h_{FE} as follows :

100	R	200	140	S	280	200	T	400	280	U	560

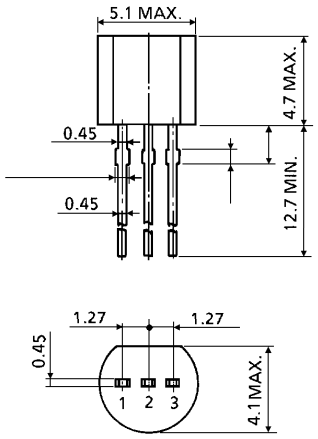
TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL JUNCTION TYPE

2SK246

FOR CONSTANT CURRENT, IMPEDANCE CONVERTER AND DC-AC HIGH INPUT IMPEDANCE AMPLIFIER CIRCUIT APPLICATIONS

- High Breakdown Voltage : $V_{GDS} = -50$ V
- High Input Impedance : $I_{GSS} = -1$ nA (Max.) ($V_{GS} = -30$ V)

Unit in mm



1. SOURCE
2. GATE
3. DRAIN

JEDEC	TO-92
EIAJ	SC-43
TOSHIBA	2-5F1C

Weight : 0.21 g

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Gate-Drain Voltage	V_{GDS}	−50	V
Gate Current	I_G	10	mA
Drain Power Dissipation	P_D	300	mW
Junction Temperature	T_j	125	°C
Storage Temperature Range	T_{stg}	−55~125	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Cut-off Current	I_{GSS}	$V_{GS} = -30$ V, $V_{DS} = 0$	—	—	−1.0	nA
Gate-Drain Breakdown Voltage	$V_{(BR)GDS}$	$V_{DS} = 0$, $I_G = -100$ μA	−50	—	—	V
Drain Current	I_{DSS} (Note)	$V_{DS} = 10$ V, $V_{GS} = 0$	1.2	—	14	mA
Gate-Source Cut-off Voltage	$V_{GS(OFF)}$	$V_{DS} = 10$ V, $I_D = 0.1$ μA	−0.7	—	−6.0	V
Forward Transfer Admittance	$\|Y_{fs}\|$	$V_{DS} = 10$ V, $V_{GS} = 0$, f = 1 kHz	1.5	—	—	mS
Input Capacitance	C_{iss}	$V_{DS} = 10$ V, $V_{GS} = 0$, f = 1 MHz	—	9.0	—	pF
Reverse Transfer Capacitance	C_{rss}	$V_{DG} = 10$ V, $I_D = 0$, f = 1 MHz	—	2.5	—	pF

(Note) : I_{DSS} Classification Y : 1.2~3.0 mA, GR : 2.6~6.5 mA, BL : 6~14 mA

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HD750 ELECTRICAL PARTLIST

MAINBOARD ASSEMBLY

Reference	Part Number	Description	Quality
	9475-001000-011	**HD750 MAIN BOARD ASSY REV A**	
Resistor			
R72	1001-000314-020	CARBON FILM RESISTOR 10 OHM 1/4W +-5% AXIAL TAPE	1
R18	1001-000316-020	CARBON FILM RESISTOR 10 OHM 1/6W +-5% AXIAL TAPE	1
R41, R60, R61, R62, R76, R77, R81, R130, R159, R163, R166, R167, R168, R169	1001-001316-020	CARBON FILM RESISTOR 100 OHM 1/6W +-5% AXIAL TAPE	14
R1, R2, R4, R20, R21, R27, R74, R115, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128, R133, R157, R158	1001-002316-020	CARBON FILM RESISTOR 1K OHM 1/6W +-5% TP52	21
R28, R42, R69, R71, R75, R114, R132, R155, R156	1001-003316-020	CARBON FILM RESISTOR 10K OHM 1/6W +-5% TP52	9
R6, R29	1001-004316-020	CARBON FILM RESISTOR 100K OHM 1/6W +-5% TP52	2
R82, R153	1001-005316-020	CARBON FILM RESISTOR 1M OHM 1/6W +-5% TP52	2
R31	1001-006316-020	CARBON FILM RESISTOR 10M OHM 1/6W +-5% AXIAL TAPE	1
R23	1001-200316-020	CARBON FILM RESISTOR 12 OHM 1/6W +-5% AXIAL TAPE	1
R17	1001-201316-020	CARBON FILM RESISTOR 120 OHM 1/6 W +-5% AXIAL TAPE	1
R80, R118	1001-500320-000	CARBON FILM RESISTOR 15 OHM 2W +-5%	2
R48	1001-502316-020	CARBON FILM RESISTOR 1.5K OHM 1/6W +-5% AXIAL TAPE	1
R8, R53	1001-803316-020	CARBON FILM RESISTOR 18K OHM 1/6W +-5% TP52	2
R9	1002-003316-020	CARBON FILM RESISTOR 20K OHM 1/6W +-5% AXIAL TAPE	1
R66, R112	1002-200316-020	CARBON FILM RESISTOR 22 OHM 1/6W +-5% TP52	2
R25, R131	1002-201316-020	CARBON FILM RESISTOR 220 OHM 1/6 W +-5% AXIAL TAPE	2
R40, R52	1002-202316-020	CARBON FILM RESISTOR 2.2K OHM 1/6W +-5% TP52	2
R55	1002-203316-020	CARBON FILM RESISTOR 22K OHM 1/6W +-5% TP52	1
R35	1002-204316-020	CARBON FILM RESISTOR 220K OHM 1/6W +-5% AXIAL TAPE	1
R64, R92, R110, R139	1002-207316-020	CARBON FILM RESISTOR 2.2 OHM 1/6W +-5% AXIAL TAPE	4
R161	1002-701316-020	CARBON FILM RESISTOR 270 OHM 1/6W +-5% AXIAL TAPE	1
R14, R15, R50	1002-702316-020	CARBON FILM RESISTOR 2.7K OHM 1/6W +-5% AXIAL TAPE	3
R7	1003-003316-020	CARBON FILM RESISTOR 30K OHM 1/6W +-5% AXIAL TAPE	1
D15	1003-300310-000	CARBON FILM RESISTOR 33 OHM 1W +-5%	1
R16, R83, R93, R140	1003-300316-020	CARBON FILM RESISTOR 33 OHM 1/6W +-5% AXIAL TAPE	4
R51, R95, R98, R142, R145	1003-302316-020	CARBON FILM RESISTOR 3.3K OHM 1/6W +-5% TP52	5
R5	1003-304316-020	CARBON FILM RESISTOR 330K OHM 1/6W +-5% AXIAL TAPE	1
R99, R146, R164	1003-902316-020	CARBON FILM RESISTOR 3.9K OHM 1/6W +-5% AXIAL TAPE	3
R10	1003-903316-020	CARBON FILM RESISTOR 39K OHM 1/6W +-5% AXIAL TAPE	1
R162, R165	1004-700316-020	CARBON FILM RESISTOR 47 OHM 1/6W +-5% TP52	2
R129	1004-701316-020	CARBON FILM RESISTOR 470 OHM 1/6 W +-5% AXIAL TAPE	1
R154	1004-701316-020	CARBON FILM RESISTOR 470 OHM 1/6 W +-5% AXIAL TAPE	1
R22	1004-701316-020	CARBON FILM RESISTOR 470 OHM 1/6 W +-5% AXIAL TAPE	1
R11, R12	1004-702316-020	CARBON FILM RESISTOR 4.7K OHM 1/6W +-5% TP52	2
R32, R33, R160	1004-703316-020	CARBON FILM RESISTOR 47K OHM 1/6W +-5% TP52	3
R116	1005-100316-020	CARBON FILM RESISTOR 51 OHM 1/6W +-5% AXIAL TAPE	1
R36	1005-102316-020	CARBON FILM RESISTOR 5.1K OHM 1/6W +-5% AXIAL TAPE	1
R56, R57	1005-602316-020	CARBON FILM RESISTOR 5.6K OHM 1/6W +-5% TP52	2
R73	1006-802316-020	CARBON FILM RESISTOR 6.8K OHM 1/6W +-5% AXIAL TAPE	1
R117	1007-502316-020	CARBON FILM RESISTOR 7.5K OHM 1/6W +-5% AXIAL TAPE	1
R24	1009-100316-020	CARBON FILM RESISTOR 91 OHM 1/6W +-5% AXIAL TAPE	1
R49	1009-102316-020	CARBON FILM RESISTOR 9.1K OHM 1/6W +-5% AXIAL TAPE	1
R43, R89, R94, R105, R136, R141	1011-001018-020	METAL FILM RESISTOR 100 OHM 1/8W +-1% AXIAL TAPE	6
R68, R84, R85, R88, R134, R135	1011-002018-020	METAL FILM RESISTOR 1K OHM 1/8W +-1% AXIAL TAPE	6
R45, R107, R147, R148, R149, R150, R151, R152	1011-003018-020	METAL FILM RESISTOR 10K 1/8W +-1% AXIAL TAPE	8
R30	1011-204018-020	METAL FILM RESISTOR 120K OHM 1/8W +-1% AXIAL TYPE	1
R65, R111	1011-802018-020	METAL FILM RESISTOR 1.8K OHM 1/8W +-1% AXIAL TAPE	2
R90, R137	1011-803018-020	METAL FILM RESISTOR 18K OHM 1/8W +-1% AXIAL TAPE	2
R39, R104	1011-804018-020	METAL FILM RESISTOR 180K OHM 1/8W +-1% AXIAL TAPE	2
R3, R97, R100, R144	1012-203018-020	METAL FILM RESISTOR 22K OHM 1/8W +-1% AXIAL TAPE	4
R86, R87	1013-602018-020	METAL FILM RESISTOR 3.6K OHM 1/8W +-1% AXIAL TAPE	2
R46, R91, R96, R108, R138, R143	1014-701018-020	METAL FILM RESISTOR 470 OHM 1/8W +-1% AXIAL TAPE	6
R44, R106	1014-702018-020	METAL FILM RESISTOR 4.7K OHM 1/8W +-1% AXIAL TAPE	2
R34, R102	1014-703018-020	METAL FILM RESISTOR 47K 1/8W +-1% AXIAL TAPE	2
R59, R67, R109, R113	1015-601018-020	METAL FILM RESISTOR 560 OHM 1/8W +-1% AXIAL TAPE	4
R13, R101	1016-802018-020	METAL FILM RESISTOR 6.8K 1/8W +-1% AXIAL TAPE	2

R38, R103	1019-103018-020	METAL FILM RESISTOR 91K OHM 1/8W +-1% AXIAL TAPE	2
Capacitor			
C172	1100-101043-000	CERAMIC CAP. 100PF/50V +-10%	1
C51, C61	1100-102043-000	CERAMIC CAP. 1000PF/50V +-10%	3
C62	1100-103043-000	CERAMIC CAP. 0.01uF/50V +-10%	1
C2,C3,C5,C14,C15,C18,C23, C24,C27,C28,C34,C42,C48,C53, C54,C55,C57,C59,C63,C65,C73, C74, C76, C85,C86, C88,C90, C95,C96, C97,C98, C99,C102, C103,C106, C107,C108,C109, C113,C115,C117, C119,C122, C124,C126, C127,C147,C149, C150,C151,C155, C156,C157, C164	1100-104044-000	CERAMIC CAP. 0.1uF/50V +-20%	54
C4, C9, C134	1100-221043-000	CERAMIC CAP. 220pF/50V +- 10%	3
C25	1100-331043-000	CERAMIC CAP. 330PF/50V +-10%	1
C49	1100-333043-000	CERAMIC CAP. 0.033UF/50V +-10%	1
C8, C58	1100-471043-000	CERAMIC CAP. 470PF/50V +-10%	2
C16 , C17, C36	1100-473043-000	CERAMIC CAP. 0.047uF/50V +-10%	3
C12, C13	1100-680043-000	CERAMIC CAP. 68pF/50V +-10%	2
C82, C128, C129, C141	1101-102062-000	POLYESTER/MYLAR CAP. 0.001UF/100V +-5%	4
C71	1101-103062-000	POLYESTER/MYLAR CAP. 0.01UF/100V +-5%	1
C67, C70	1101-122062-000	POLYESTER/MYLAR CAP. 0.0012UF/100V +-5%	2
C81, C140	1101-153062-000	POLYESTER/MYLAR CAP. 0.015UF/100V +-5%	2
C40	1101-222062-000	POLYESTER/MYLAR CAP. 2200PF/100V +-5%	1
C29, C39	1101-273062-000	POLYSTER CAP. 0.027UF/100V +-5%	2
C41	1101-562062-000	POLYESTER/MYLAR CAP. 5600PF/100V +-5%	1
C80, C139	1101-682062-000	POLYESTER/MYLAR CAP. 0.0068UF/100V +-5%	2
C114, C116, C118, C121, C123, C125, C132, C143, C152, C153, C161	1102-100014-000	ELECT. CAP. 10UF/16V +-20%	11
C43, C56, C64	1102-101013-000	ELECT. CAP. 100UF/16V +-10%	3
C20, C91, C93, C94, C101, C105	1102-101024-000	ELECT. CAP. 100UF/25V +-20%	5
C89, C92	1102-101034-000	ELECT.CAP. 100UF/35V +-20%	2
C32, C52, C104	1102-102024-000	ELECT. CAP. 1000UF/25V +-20%	3
C7	1102-220014-000	ELECT. CAP. 22uF/16V +-20%	1
C19, C21, C22, C26, C75, C112, C120	1102-221014-000	ELECT. CAP. 220UF/16V +-20%	7
C87	1102-221034-000	ELECT. CAP. 220UF/35V +-20%	1
C84	1102-222024-000	ELECT. CAP. 2200UF/25V +-20%	1
C77, C136	1102-227044-000	ELECT. CAP. 2.2UF/50V +-20%	2
C78, C137	1102-330004-000	ELECT. CAP. 33uF/10V +- 20%	2
C60, C83, C135, C142	1102-331014-000	ELECT. CAP. 330uF/16V +-20%	4
C33, C130, C131	1102-470013-001	ELECT. CAP. 47UF/16V +-10% (BLACK)	3
C11, C66, C68, C110, C111, C165, C168, C169, C170, C171	1102-471014-000	ELECT. CAP. 470uF/16V +-20% 8X12MM	10
C100	1102-471044-000	ELECT. CAP. 470uF/50V +-20%	1
C167	1106-105044-000	MONO CAP. 1UF/50V +-20%	1
C38	1106-155043-000	MONO CAP. 1.5UF/50V +-10%	1
C69	1106-224043-000	MONO. CAP. 0.22uF/50V +-10%	1
C46	1106-334043-000	MONO CAP. 0.33UF/50V +-10%	1
C44	1106-474043-000	MONO CAP. 0.47UF/50V +-10%	1
C79, C138	1181-100042-000	CERAMIC CAP. 10PF/50V +-5% NPO	2
C144	1181-101042-000	CERAMIC CAP. 100PF/50V +-5% NPO	1
C47	1181-121042-000	CERAMIC CAP. 120PF/50V +-5% NPO	1
C35	1181-150042-000	CERAMIC CAP. 15PF/50V +-5% NPO+- 60PPM	1
C10, C30, C31, C50	1181-220042-000	CERAMIC CAP. 22PF/50V +-5% NPO 60 PPM	4
Transistor			
Q8	1300-100300-100	TRANSISTOR NPN KSR1003 (SAMSUNG)	1
Q2, Q3	1300-114000-400	TRANSISTOR DTC114YS	2
Q18, Q19, Q24, Q27, Q28, Q31	1300-174000-100	TRANSISTOR NPN 2SC1740 TO-92	6
Q15	1300-218150-100	TRANSISTOR NPN 2SC1815Y TO-92	1
Q6, Q13, Q20, Q23	1300-338200-100	TRANSISTOR NPN 2SC 3382 CENTER C TO92	4
Q10, Q30	1300-805000-100	TRANSISTOR NPN 8050D TO92 SAMSUNG	2
Q7, Q12, Q21, Q22	1301-139100-100	TRANSISTOR PNP 2SA1391 CENTER C TO92	4
Q11	1301-200300-100	TRANSISTOR PNP KSR2003 (SAMSUNG)	1
Q9, Q11	1301-200300-100	TRANSISTOR PNP KSR2003 (SAMSUNG)	2
Q1	1301-564000-100	TRANSISTOR PNP KSB564A-Y (SAMSUNG)	1
Q4, Q14, Q29	1301-855000-100	TRANSISTOR PNP SS8550C TO-92 (SAMSUNG)	3

Q5	1301-928000-100	TRANSISTOR PNP KSA928A TO-92 SAMSUNG	1
Q25,Q32	1301-933000-100	TRANSISTOR PNP 2SA933 TO92	2
Q17, Q26	1302-246000-100	TRANSISTOR FET 2SK246GR TO92	2
Bridge, Diode, Zener			
IC7, IC8	1401-101000-000	BRIDGE RECTIFIER DB101 50V 1A UL	2
D2, D3, D4, D5	1401-140040-000	DIODE RECTIFIER 1N4004	4
D1, D6, D7, D9, D10, D17	1401-141480-000	DIODE 1N4148	6
D16	1402-240001-200	ZENER DIODE DZ24V	1
D8	1402-471201-200	ZENER DIODE 4.7V 1/2W	1
Coil, Inductor			
J32, L6, L7, L8	1500-650400-000	INDUCTOR COIL 65UH + -20%	4
	1503-161280-100	FERRITE COIL T16128 SIZE: 16X12X8	2
L1, L2, L3, L4, L5, L9, L11, L12, L13, L14, L15, L16, L17	1504-100300-100	AXIAL INDUCTOR 10UH +-10%	13
T1	3299-838000-000	DIGITAL OUTPUT COIL FOR FL8380	1
Crystal			
X3	1600-100003-000	CRYSTAL 10MHz +-30PPM 49U TYPE	1
X1	1600-169343-000	CRYSTAL 16.9344 +- 30 PPM 49U3H TYPE	1
Cable, Connector, Jack			
DOA, DOB	2300-002000-001	STRAIGHT CONN WAFER 2PIN 2MMP JST	2
CN8	2300-003100-000	STRAIGHT CONN. WAFER 3 PINS 2.5mmP	1
RCA-B	2300-004000-002	STRAIGHT CONN WAFER 4PINS 2MMP JST	1
CN1	2300-005000-000	STRAIGHT CONN. WAFER 5 PINS 2mmP	1
CN3, CN5	2300-006000-000	STRAIGHT CONN. WAFER 6 PINS 2mmP	2
CN7	2300-006100-000	STRAIGHT CONN. WAFER 6PINS 2.5mmP	1
CN12	2300-010000-000	STRAIGHT CONN. WAFER 10 PINS 2mmP	1
CN2	2301-016901-000	16PIN FILM TYPE CABLE STRAIGHT CONN	1
REM1, REM2	2321-003911-002	MIC JACK 3.5MM JY-3510-01-010	2
CN6	2330-002901-005	RCA JACK RCA-108 (ORANGE)	1
CN4	2330-003901-305	RCA JACK WITH SHIELD PLATE RCA-213D	1
DOA-DOB	2511-022701-140	2PIN 270MM 2CONN SHIELD CABLE AWG#26 2MMP	1
RCA-A	2511-043301-151	4PIN 330MM 2CONN S CABLE #28 UL1533 2MMP S2M-CSAN	1
	2605-100502-000	50MM GND WIRE 1RING (M3) AWG#22 BLK	2
Fuse, Relay			
F2, F3	4030-100000-001	SLOW BLOW MICRO FUSE 1A	2
F1	4030-160000-512	FUSE 1.6A 250V GLASS TUBE SLOW BLOW (BELL 5TT1.6)	1
RL2	4050-000005-002	RELAY ME-2-5 DC 5V GS-SH-205T	1
RL1	4050-212000-003	RELAY 12V 5A MI-SH-212L (GOOD SKY)	1
IC			
IC14	4117-320104-600	PCM1732 VOLTAGE OUTPUT DELTA-SIGMA DAC BURR-BROW	1
U1	4145-600001-600	I.C. NJM4560L 8PINS SIL (NJRC)	1
IC2	4166-279122-000	I.C. MN662790RSA1 QFP TYPE 80PIN DSP (PANASONIC)	1
IC15	4174-040102-910	I.C. SN74HCU04 SOP (T.I.)	1
IC9, IC11, U3	4178-050334-700	I.C. L7805CV TO220 THOMSON	3
IC10	4178-080302-600	I.C. L7808CV TO-220 (SGS-THOMSON)	1
IC12	4178-080310-000	I.C. 78L08 TO92 (MIRCO)	1
IC13	4179-080311-600	I.C. 79L08 TO92 (NJRC)	1
U4	4181-700010-000	I.C. LTV817B LITON	1
IC5	4188-140102-000	I.C. AN8814SB SMT 28PIN MOTOR DRIVER (PANASONIC)	1
IC4	4201-750000-600	I.C. CD MCU 750-3 HD6433642RB47H	1
PCB, Misc			
	4875-010010-002	HD750 MAIN PC BOARD REV B	1
	4031-004000-000	FUSE CLIP FOR 5X20MM HF-004/P	2
IC10, IC11	6501-010001-000	HEAT SINK	2
IC9, U3	6575-010004-000	HEAT SINK	2
IC9, U3	6600-120030-001	NUT M3 HEX M3X5.5X2.4MM	2
IC9, U3	7003-008010-111	SCREW M3X8 B/H BLACK	2

HEADPHONES BOARD ASSEMBLY

Reference	Part Number	Description	Quality
	9475-001000-021	**HD750 HEADPHONE BOARD ASSY REV A**	
Resistor			
R409, R410	1001-002316-000	CARBON FILM RESISTOR 1K OHM 1/6 W +-5%	2
R413, R414	1001-004316-000	CARBON FILM RESISTOR 100K OHM 1/6 W +-5%	2
R411, R412	1001-202316-000	CARBON FILM RESISTOR 1.2K OHM 1/6 W +-5%	2
R401, R402	1002-003316-000	CARBON FILM RESISTOR 20K OHM 1/6W +-5%	2
R407 , R408	1004-704316-000	CARBON FILM RESISTOR 470K OHM 1/6 W +-5%	2
R403, R404, R405, R406	1006-800316-000	CARBON FILM RESISTOR 68 OHM 1/6W +-5%	4
VR401	1065-003500-130	VAR. RESISTOR 50k 1/4W +-20% ROTARY B-TYPE	1
Capacitor			

C413, C414	1100-102044-000	CERAMIC CAP. 1000PF/50V +-20%	2
	1100-103043-000	CERAMIC CAP. 0.01uF/50V +-10%	2
C410, C412	1100-103044-000	CERAMIC CAP. 0.01UF/50V +-20%	2
C407, C408	1101-473062-000	POLYESTER/MYLAR CAP. 0.047UF/100V +-5%	2
C409, C411	1102-101024-000	ELECT. CAP. 100UF/25V +-20%	2
C415, C417	1102-471014-000	ELECT. CAP. 470uF/16V +-20% 8X12MM	2
Cable, Connector			
JK401	2320-009911-003	6.4MM HEADPHONE JACK (JY-6303-02-030)GOLD PLATED	1
CN401	2511-066501-152	6PIN 650MM 2CO.S CABLE #28UL1533 2MMP S2M-CSAN BLK	1
IC			
IC401	4145-600001-600	I.C. NJM4560L 8PINS SIL (NJRC)	1
PCB, Misc			
	4875-010020-001	HD750 HEADPHONE BOARD REV A	1
	6583-810005-000	SHIELD PLATE PHONE PCB	1
	6600-070003-000	CD90R05 RUBBER PAD,LEG	2

POWER SWITCH BOARD ASSEMBLY

Reference	Part Number	Description	Quality
	9475-001000-111	**HD750 POWER CONTROL BOARD ASSY REV A**	
Connector, Switch			
CON1	2300-005000-000	STRAIGHT CONN. WAFER 5 PINS 2mmP	1
S841	2400-020200-000	TACT SW 2P2T KPT-1105A (5MM)	1
LED			
D841	3100-204000-001	LED 5MM BI- COLOR A/G #BL-BAG204	1
PCB			
	4875-000110-001	HD750 POWER CONTROL BOARD REV A	1

DOOR SWITCH BOARD ASSEMBLY

Reference	Part Number	Description	Quality
	9475-001000-141	**HD750 KEY BOARD ASSY REV A**	
Connector, Switch			
CN1	2300-002000-000	STRAIGHT CONN. WAFER 2 PINS 2mmP	1
S4	2400-020200-000	TACT SW 2P2T KPT-1105A (5MM)	1
PCB			
	4875-010140-001	HD750 KEY PC BOARD REV A	1

VFD BOARD ASSEMBLY

Reference	Part Number	Description	Quality
	9475-001000-261	**HD750 VFD BOARD ASSY REV A**	
Resistor			
R2, R3, R4, R5, R6, R7, R8, R10, R11, R12, R13	1001-001316-000	CARBON FILM RESISTOR 100 OHM 1/6 W +-5%	11
R1, R406, R407, R408, R409, R410	1001-003316-000	CARBON FILM RESISTOR 10K OHM 1/6 W +-5%	6
R14	1001-201316-000	CARBON FILM RESISTOR 120 OHM 1/6 W +-5%	1
R402, R403, R404	1001-501316-000	CARBON FILM RESISTOR 150 OHM 1/6 W +-5%	3
R9	1004-301316-000	CARBON FILM RESISTOR 430 OHM	1
R401	1005-103316-000	CARBON FILM RESISTOR 51K OHM 1/6W +-5%	1
R405	1007-500316-000	CARBON FILM RESISTOR 75 OHM 1/6W +-5%	1
Capacitor			
C1, C2, C3, C4, C401	1100-104044-000	CERAMIC CAP. 0.1uF/50V +-20%	5
E401, E402	1102-101014-000	ELECT. CAP. 100uF/16V +-20%	2
E1	1102-101024-000	ELECT. CAP. 100UF/25V +-20%	1
Transistor, Diode, LED			
Q1, Q2, Q3	1300-114000-400	TRANSISTOR DTC114YS	3
D402, D403, D404, D405	1401-141480-000	DIODE 1N4148	4
D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24	3100-420410-000	LED GREEN COLOR ROUND HEAD 3MM 4204-10VGT-A	24
Cable, Connector, Switch			
W401	2300-002010-000	RIGHT ANGLE CONN WAFER 2PIN 2MMP	1
W403	2300-005010-000	RIGHT ANGLE CONN WAFER 5PIN 2mmP	1
S401, S402, S403, S404, S405, S406, S407, S408, S409, S410	2400-020200-000	TACT SW 2P2T KPT-1105A (5MM)	10
W401	2501-023001-150	2PIN 300MM 2CONN CABLE AWG#28 UL1571 2MMP	1
W403	2501-052501-151	5PIN 250MM 2CONN CABLE AWG#28 2mmP (BLACK)	1
W803	2506-101501-151	10PIN 150MM 2CONN R.CABLE #28 UL2651 2MMP S2M-CSAN	1

IC			
U401	4163-110123-800	IC PTC PT6311 QFP (VFP DRIVER)	1
PCB, Misc			
	1503-161280-100	FERRITE COIL T16128 SIZE: 16X12X8	1
U402	3001-260430-000	INFRARED SENSOR PIC26043TM2 TCD1600 OPTO	1
VFD1	3106-120500-000	VFD DISPLAY SAMSUNG (HNV-12SM05)	1
	4875-010260-003	HD750 VFD PC BOARD REV C	1

HD750 MECHANICAL PARTLIST

Part Number	Description	Quality
9675-001000-001	**HD750 MECHAN ASSY230VVDEVFD(HARMAN/KARDON HD750).A**	
2504-162009-990	16PINS 200MM FFC CABLE 1MMP 0.035MM THICK	1
2506-051701-150	5PIN 170MM 2CONN RIBBON CABLE AWG#28 2MM	1
2506-061601-150	6PIN 160MM 2CONN RIBBON CABLE AWG#28 300V 2.0MMP	1
2610-218309-015	1830MM AC POWER CORD VDE BLACK (CARRY ON) (C0-001)	1
3200-837000-000	TRANSFORMER EI-48 230V VDE (TAMURA)	1
4002-311975-000	TOROID COILS 'T31X19X7.5MM'	2
4032-100155-000	SOLDER PLATE 10015-5 YUET CHUNG	1
4081-000000-008	INSULATION SHEET PVC 50X15X0.5MM (HD750)	1
5110-362000-000	LASER PICK UP LABEL	1
5110-750100-000	LVD WARNING LABEL ENG VR FOR HD750 54X28	1
6021-200708-001	YN21Z R. F. PULLEY HOLDER	1
6029-010012-001-01	PLASTIC FOOT (HOT STAMPING)	4
6075-010002-000-01	CD DOOR, PAINTED	1
6075-010003-000-01	HK HD750 DISPLAY LENS (W SILKSCREEN)	1
6075-010007-000	DIFFUSER	1
6075-010008-000	DIFFUSER	1
6083-810011-000	FILTER, FL (PVC 0.5t)	1
6090-050113-000	CD90 PCB MOUNT (STAND OFF)	9
6575-010001-000-01	W/BLK PAINTED BOTTOM CABINET	1
6575-010002-000-01	TOP CABINET, PAINTED	1
6575-010003-000-01	REAR CABINET, SILKSCREEN	1
6583-810004-000	HARMAN KARDON LOGO BADGE	1
6600-070003-000	CD90R05 RUBBER PAD,LEG	4
6600-120040-000	SCREW NUT M4X7X3	2
6600-180007-000	AC CORD BUSHING (PG5RF-5B)	1
6600-240003-001	CLOSE END CONNECTOR (CE-1)	2
7002-616002-111	SCREN M2.6X16 P.T.P B/H BLACK	8
7002-618002-111	SCREW M2.6X18 P.T.P B/H BLACK	1
7003-006001-001	SCREW M3x6 S.T.P BW/H (BLACK)	4
7003-006001-111	SCREW M3X6 S.T.P. B/H (BLACK)	4
7003-006001-112	SCREW M3X6 S.T.P. B/H	1
7003-008002-111	SCREW M3X8 P.T.P. B/H (BLACK)	2
7003-008010-111	SCREW M3X8 B/H BLACK	2
7004-010010-112	SCREW M4X10 B/H	2
7104-010010-022	WASHER M4X10X1MM	2
9114-000000-001	CABLE TIE 2.5(W)X80(L)MM	6
9116-404350-750	DOUBLE SIDE TAPE (W)40X435MM FOR HD750	1
9475-001000-011	**HD750 MAIN BOARD ASSY REV A**	1
9692-006002-161	**PU92TL-216 W/SONY 213CCM REV A**	1
8575-001010-301	**HD750 FRONT PANEL ASSY REV A**	
6075-010001-000-01	FRONT PANEL, PAINTED	1
6075-010004-000-01	BUTTON, OPEN/CLOSE, PAINTED	1
6075-010005-000-01	BUTTON DISC, PAINTED	1
6075-010006-000-01	CAP, BUTTON DISC, PAINTED	1
6083-810007-000-01	BUTTON PLAY, PAINTED	1
6083-810013-000-01	KNOB, VR, PAINTED	1
6083-810014-000-01	BUTTON STANDBY, PAINTED	1
6083-810015-000	INDICATOR, STANDBY SAN(MILKY)	1
6583-510006-000	BRACKET, PHONES (MIC)	1
6600-210035-000	PADCOCK 10X10X7MM	1
6600-210060-000	PADCOCK 70X12X6t	1
7003-006002-111	SCREW M3X6 P.T.P. B/H (BLACK)	1
7003-008002-111	SCREW M3X8 P.T.P. B/H (BLACK)	13
9475-001000-021	**HD750 HEADPHONE BOARD ASSY REV A**	1
9475-001000-111	**HD750 POWER CONTROL BOARD ASSY REV A**	1
9475-001000-141	**HD750 KEY BOARD ASSY REV A**	1
9475-001000-261	**HD750 VFD BOARD ASSY REV A**	1

HD750 CD LOADER MECHANISM PARTLIST

Part Number	Description	Quality
9692-006002-161	**PU92TL-216 W/SONY 213CCM REV A**	
2300-005010-000	RIGHT ANGLE CONN WAFER 5PIN 2mmP	1
2411-010120-029	LEAF SWITCH MSW-1731 CVCE	2
3009-213000-000	SONY CD MECHANISM 213CCM	1
4892-050700-012	PU92TL LOADING PCB REV B	1
6090-050010-000	CD90 LOADING MOTOR PULLEY	1
6091-060006-000	CHUCKING PULLEY	1
6092-050001-001	PU92TL TRAY	1
6092-050003-000	PU92TL MOLDED CHASSIS	1
6092-050004-001	PU92TL CHUCKING BRACKET	1
6092-050005-000	PU92TL TRAY DRIVER GEAR	1
6092-050006-000	PU92TL CONTROL CAM	1
6092-050007-000	PU92TL INTERMEDIATE GEAR	1
6092-050008-000	PU92TL GEAR COVER	1
6092-050009-000	PU92TL GEAR ROD	1
6092-050010-000	PU92TL LOAD PULLEY	1
6092-050011-001	STOPPER PIN	1
6092-050013-001	BRACKET CD MECHA	1
6591-060007-000	CHUCKING METAL PLATE	1
6600-010288-001	SPRING, CD INNER	2
6600-010289-000	SPRING, CD OUTER	2
6600-090001-001	LOADING MOTOR BELT	1
6600-140001-000	CD90F01 CHUCKING METAL PLATE FELT RING	1
6600-150006-001	CHUCKING MAGNET	1
6600-170073-000	RUBBER CUSHION	4
7002-005003-112	SCREW M2X5 B TYPE B/H ZN	1
7002-602510-112	SCREW M2.6X2.5 B/H	2
7002-608002-022	SCREW M2.6X8 P.T.P. P/H	4
7002-608003-062	SCREW M2.6X8 W/H B.T.B. WASHER HEAD DIA. 7.8MM	4
7002-616002-062	SCREW M2.6X16 W/H P.T.P.	1
7102-307003-022	WASHER 2.3X7.0X0.3MM	1
7102-712706-022	WASHER DIA2.7XDIA12.7X0.6mm ST/ZN	4
RF-500TB-14415	DC MOTOR MABUCHI RF-500TB-14415 (DC002VT00003)	1

HD750 PACKING MATERIAL

Part Number	Description	Quality
2611-310009-000	1M AUDIO CABLE	1
2613-210009-000	1M VIDEO CABLE	1
2617-210004-001	3.5MM MIC CABLE 2CONN 1000MM AWG#26 UL2468	1
5000-750103-000	POLYFOAM (1) DENSITY:63±5g	2
5000-750104-000	POLYFOAM (2)	1
5013-750001-000-01	CARTON BOX, PAINTED	1
5100-750100-100	HK HD750 REV 1 MULTI-LANG 1/B	1
5100-837000-200	HARMAN/KARDON FL8370 & 8570 HDCD INTRODUCTION CARD	1
5110-838000-000	INSTRUCTION LABEL	1
5113-000000-000-21	MANUFACTURE DATE CADE LABEL FOR HD750 (220V)	1
5113-838000-000-03	BARCODE S/N LABEL FOR HD750 (YC0009-01001)	3
5200-080250-030	POLYBAG 80X250X3C MM	1
5200-100180-030	POLYBAG FOR AUDIO CORD	1
5200-230321-030-01	POLYBAG FOR ACCESSORIES (FL8350/FL8550)	1
5200-570550-040-01	POLYBAG FOR UNIT W PRINTING	1
5206-500160-050	E.P.E. SHEET P-EP500160-05	1

HD750 REMOTE UNIT PARTLIST

REMOTE UNIT MECHANICAL PARTLIST

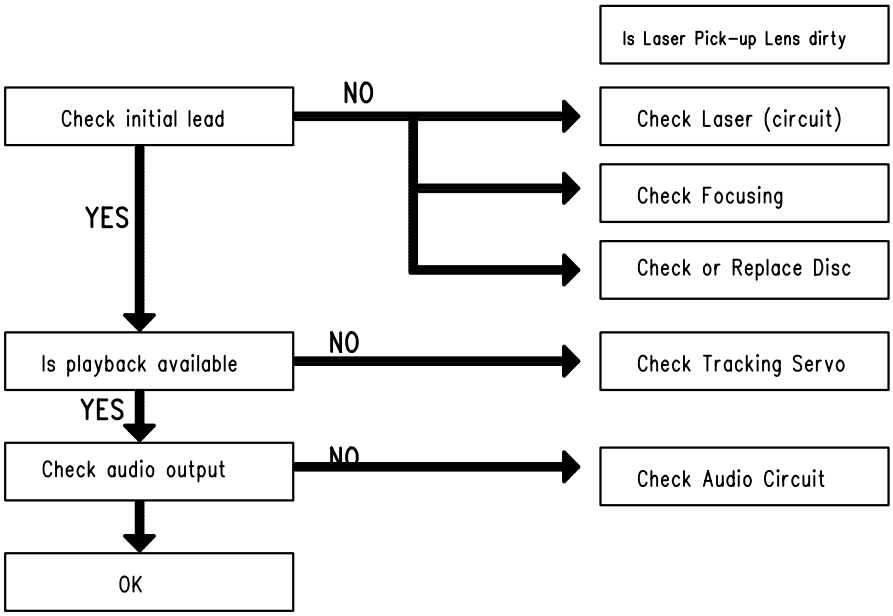
Part Number	Description	Quality
9805-020075-001	**REMOTE UNIT (RT-02) 28 KEYS FOR HD750 REV A**	
5200-080250-030	POLYBAG 80X250X3C MM	1
6002-000001-000-18	HK HD750 RT-02 TOP CASE (W SILKSCREEN)	1
6002-000002-000	RT02-P002 CASE BOTTOM	1
6002-000003-001	RT02-P003 COVER BATTERY	1

6002-000019-000-01	HARMAN KARDON HD750 REMOTE INLAY 28KEYS	1
6600-010156-001	CONTACT BATTERY COMMON	1
6600-010157-000	RT02-S002 CONTACT BATTERY POS	1
6600-010158-000	RT02-S003 CONTACT BATTERY NEG	1
6600-070116-000	KEY PAD 28 KEYS FOR RT-02	1
7002-008002-021	SCREW M2X8 P TYPE P/H BLK	1

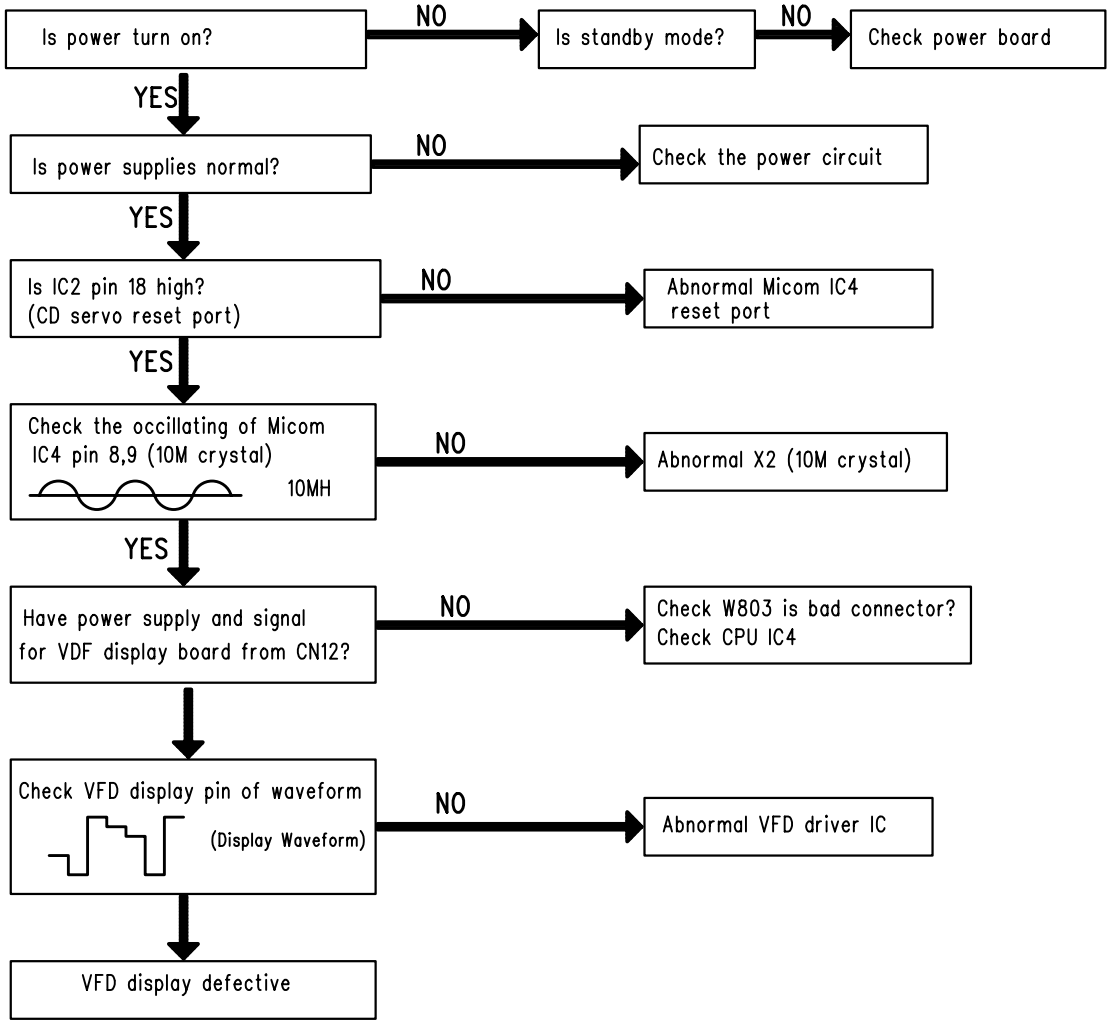
REMOTE CONTROL BOARD ASSEMBLY

Reference	Part Number	Description	Quality
	9475-001000-081	**HD750 REMOTE CONTROL BOARD ASSY REV A**	
Resistor			
R2, R3, R4, R5	1001-004316-000	CARBON FILM RESISTOR 100K OHM 1/6 W +-5%	4
R1	1001-507314-000	CARBON FILM RESISTOR 1.5 OHM 1/4W +-5%	1
Capacitor			
C1, C2	1100-221043-000	CERAMIC CAP. 220pF/50V +- 10%	2
C3	1102-470004-002	ELECT. CAP. 47UF/10V +-20% MINI SIZE	1
IC, Transistor, Diode			
Q2	1300-212000-100	TRANSISTOR NPN C2120Y TO-92	1
D1	1401-113300-000	DIODE 1SS133, ROHM	1
D2	3101-333000-000	INFRARED LED IR333C/HO	1
U1	4122-220103-800	I.C. PT2222	1
PCB, Misc			
X1	1600-455001-990	CERAMIC RESONATOR KBR455BTLR22 'KYOCE'	1
	4875-010080-002	HD750 REMOTE CONTROL BOARD REV B	1

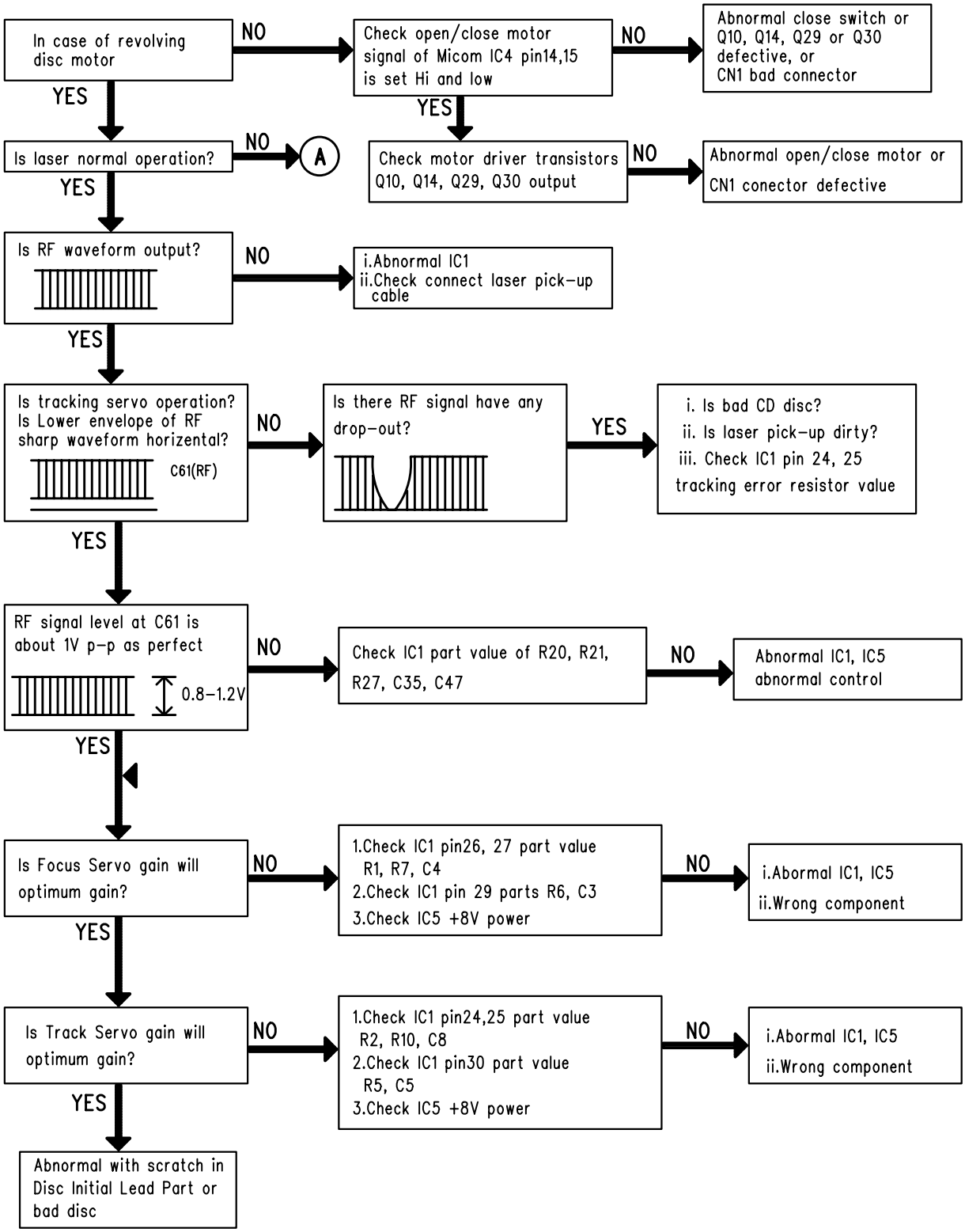
Check CD Player Is Normal Operational?



In Case of Abnormal Indication

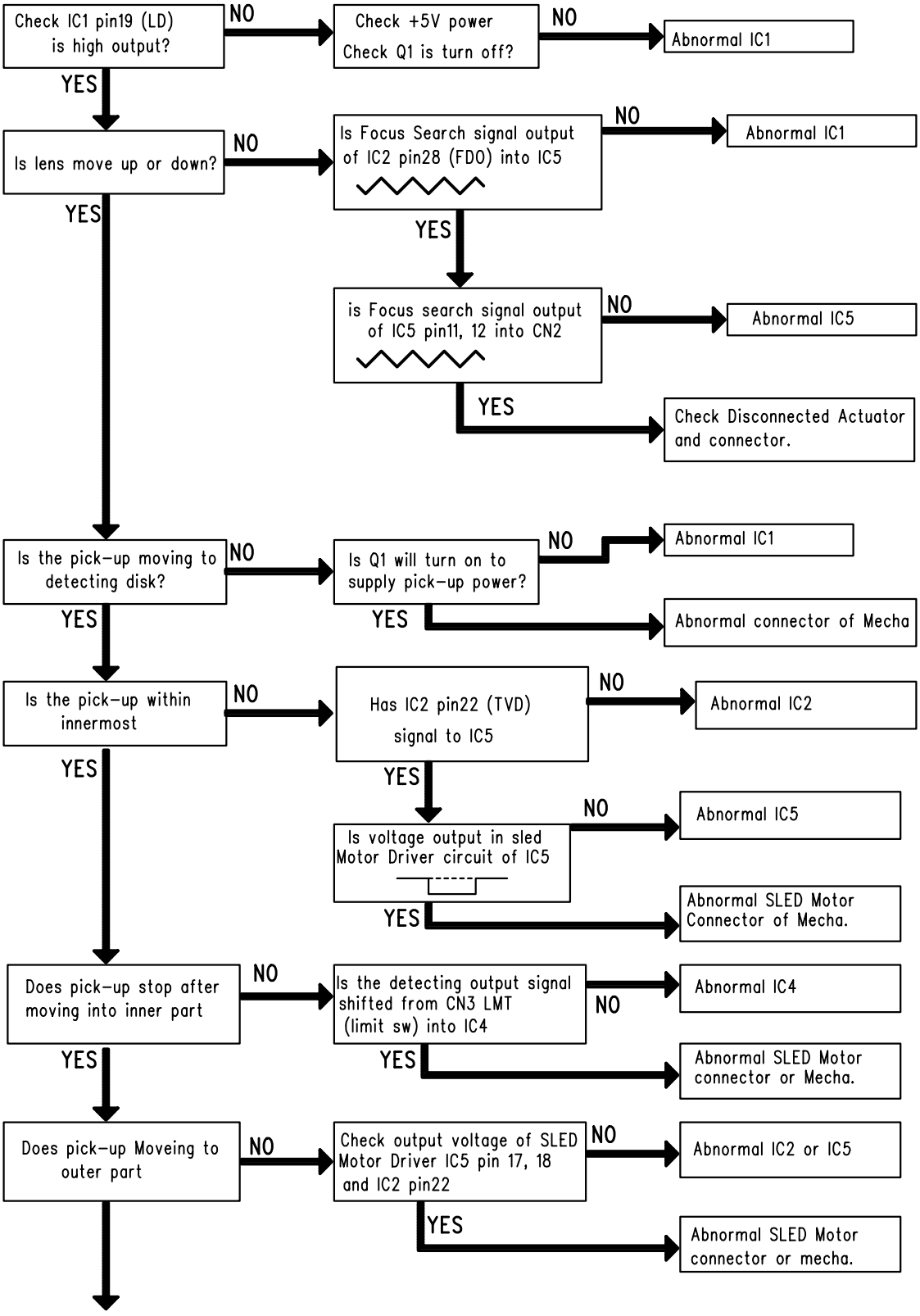


When Initial Lead-In Is Not Operational

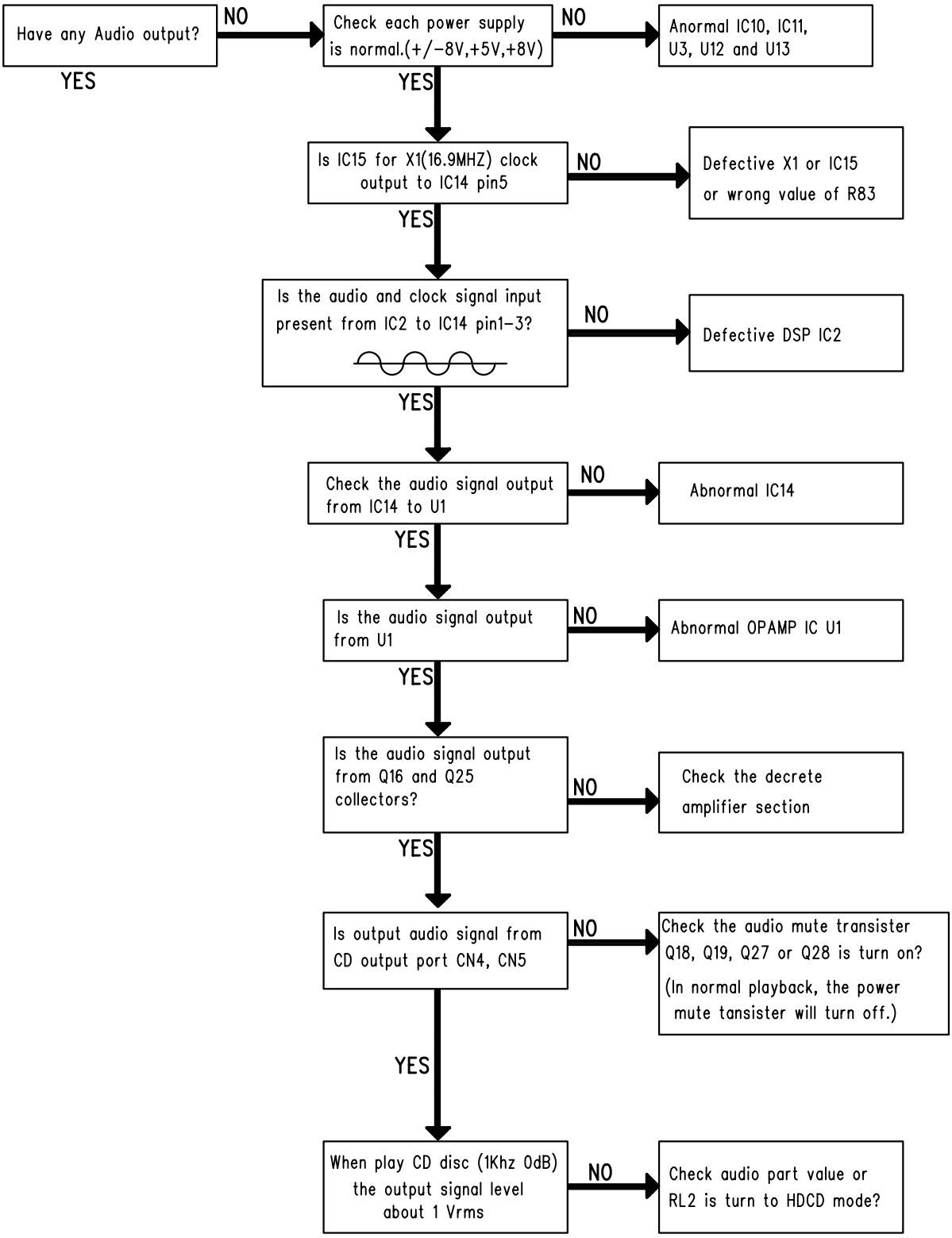

In case of revolving disc motor
NO
Check open/close motor signal of Micom IC4 pin14,15 is set Hi and low
NO
Abnormal close switch or Q10, Q14, Q29 or Q30 defective, or CN1 bad connector
YES
YES
Is laser normal operation?
NO
A
Check motor driver transistors Q10, Q14, Q29, Q30 output
NO
Abnormal open/close motor or CN1 conector defective
YES
Is RF waveform output?
NO
i.Abnormal IC1
ii.Check connect laser pick-up cable
YES
Is tracking servo operation?
Is Lower envelope of RF sharp waveform horizental?
C61(RF)
NO
Is there RF signal have any drop-out?
YES
i. Is bad CD disc?
ii. Is laser pick-up dirty?
iii. Check IC1 pin 24, 25 tracking error resistor value
YES
RF signal level at C61 is about 1V p-p as perfect
0.8-1.2V
NO
Check IC1 part value of R20, R21, R27, C35, C47
NO
Abnormal IC1, IC5 abnormal control
YES
Is Focus Servo gain will optimum gain?
NO
1.Check IC1 pin26, 27 part value R1, R7, C4
2.Check IC1 pin 29 parts R6, C3
3.Check IC5 +8V power
NO
i.Abormal IC1, IC5
ii.Wrong component
YES
Is Track Servo gain will optimum gain?
NO
1.Check IC1 pin24,25 part value R2, R10, C8
2.Check IC1 pin30 part value R5, C5
3.Check IC5 +8V power
NO
i.Abormal IC1, IC5
ii.Wrong component
YES
Abnormal with scratch in Disc Initial Lead Part or bad disc

Remark: (A) is next page

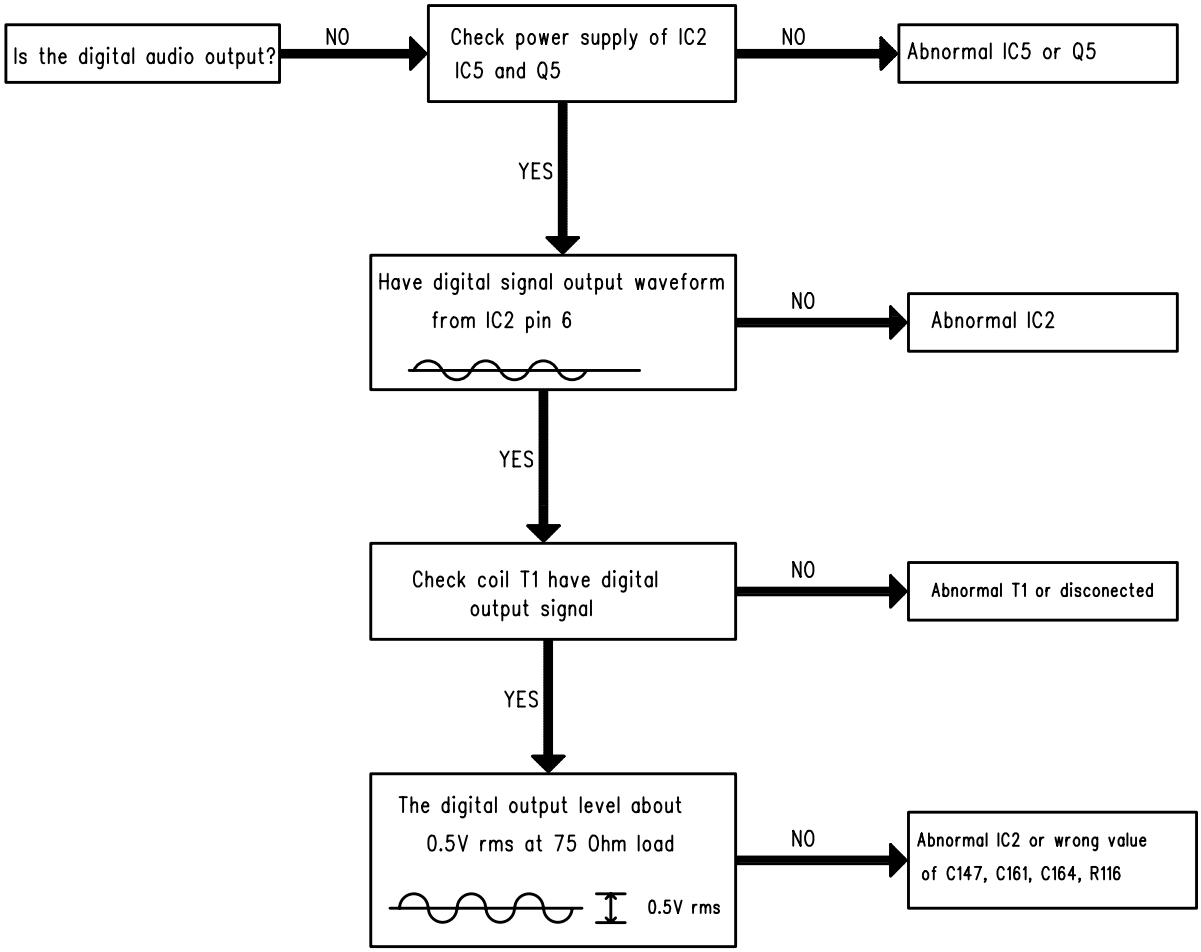
A: When Laser is NOT Operation



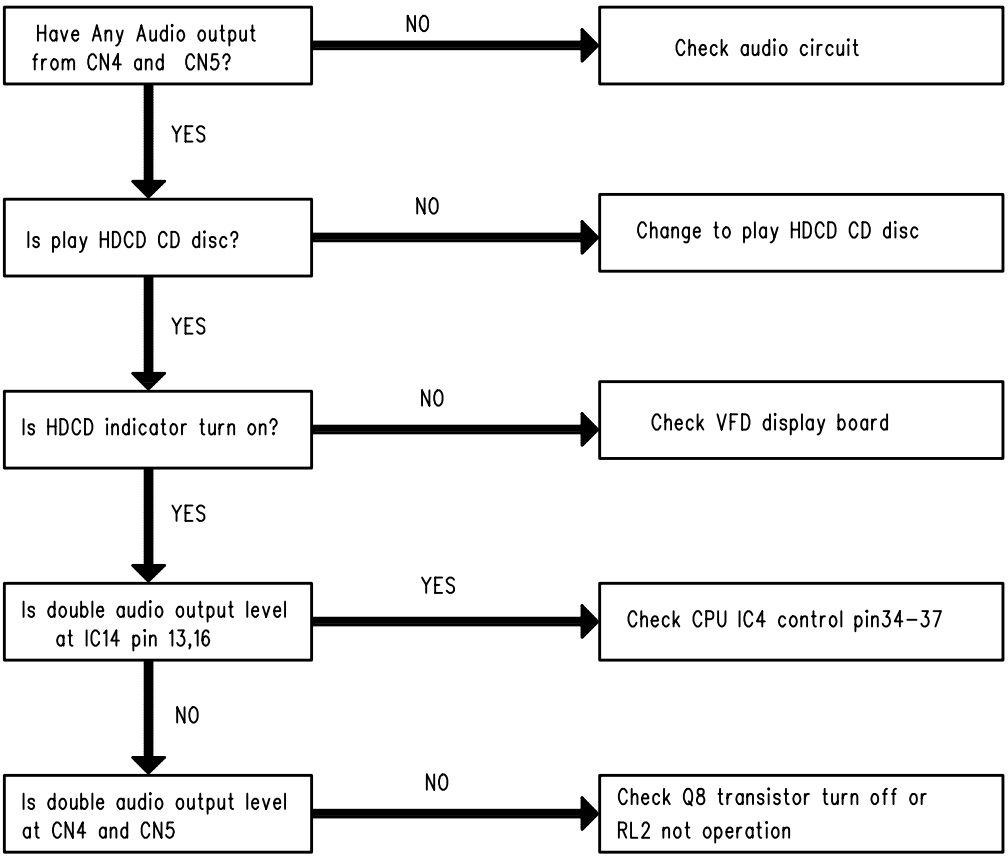
2) Audio Circuit Checking

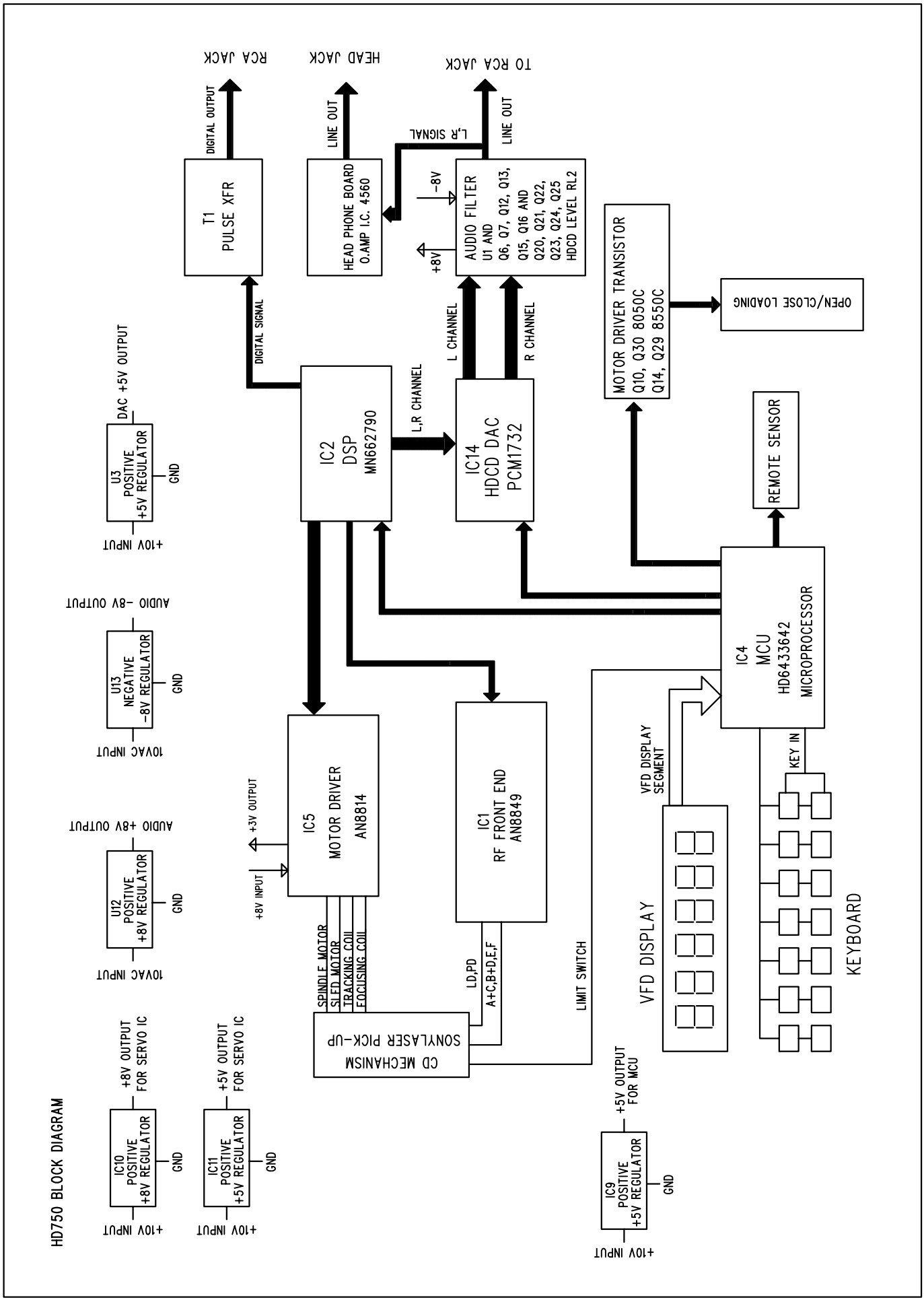

Have any Audio output?
NO
YES
Check each power supply is normal.(+/-8V,+5V,+8V)
NO
Anormal IC10, IC11, U3, U12 and U13
YES
Is IC15 for X1(16.9MHZ) clock output to IC14 pin5
NO
Defective X1 or IC15 or wrong value of R83
YES
Is the audio and clock signal input present from IC2 to IC14 pin1-3?
NO
Defective DSP IC2
YES
Check the audio signal output from IC14 to U1
NO
Abnormal IC14
YES
Is the audio signal output from U1
NO
Abnormal OPAMP IC U1
YES
Is the audio signal output from Q16 and Q25 collectors?
NO
Check the decrete amplifier section
YES
Is output audio signal from CD output port CN4, CN5
NO
Check the audio mute transister Q18, Q19, Q27 or Q28 is turn on?
(In normal playback, the power mute tansister will turn off.)
YES
When play CD disc (1Khz 0dB) the output signal level about 1 Vrms
NO
Check audio part value or RL2 is turn to HDCD mode?

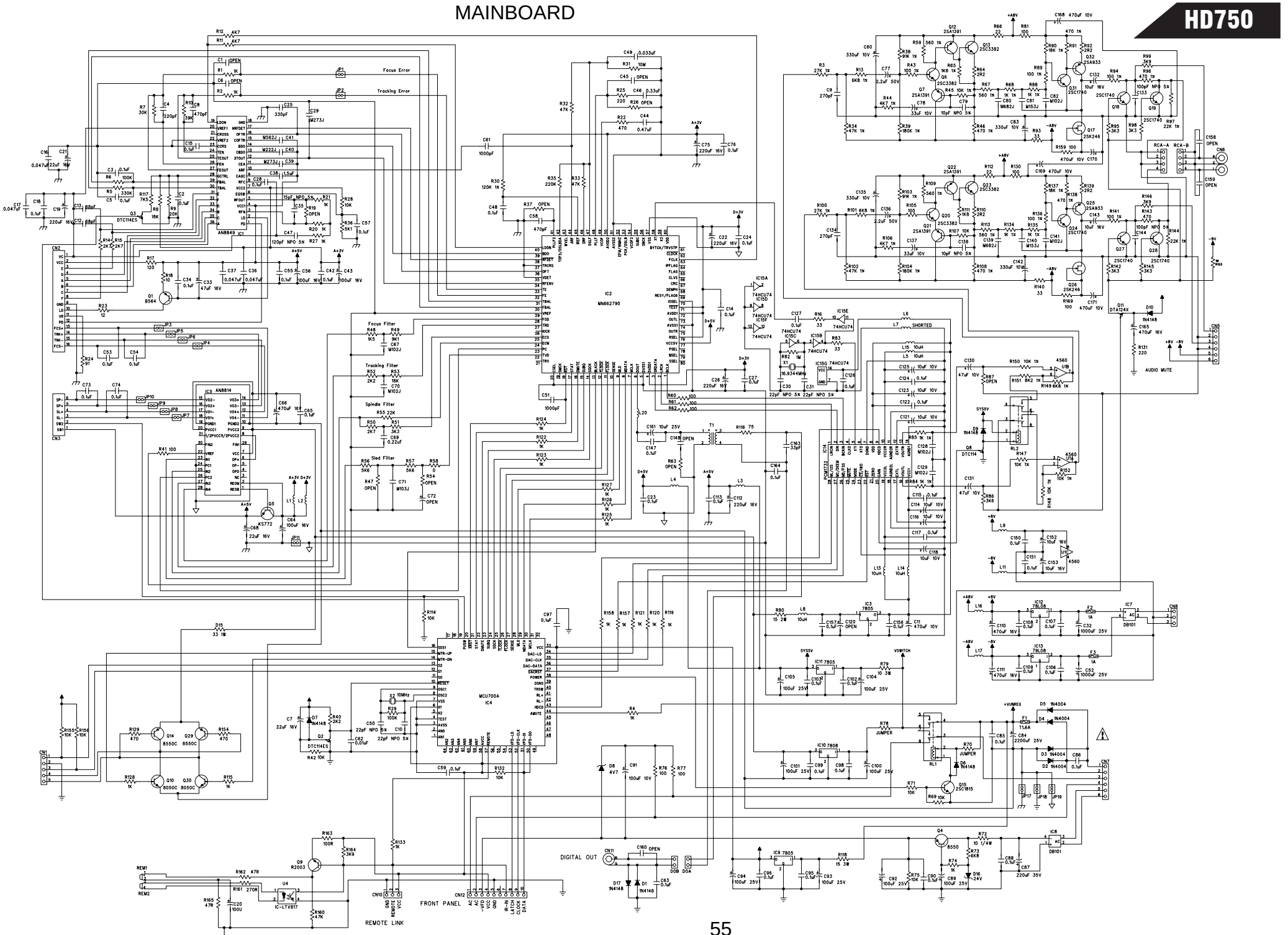
3) Check Digital Audio Circuit



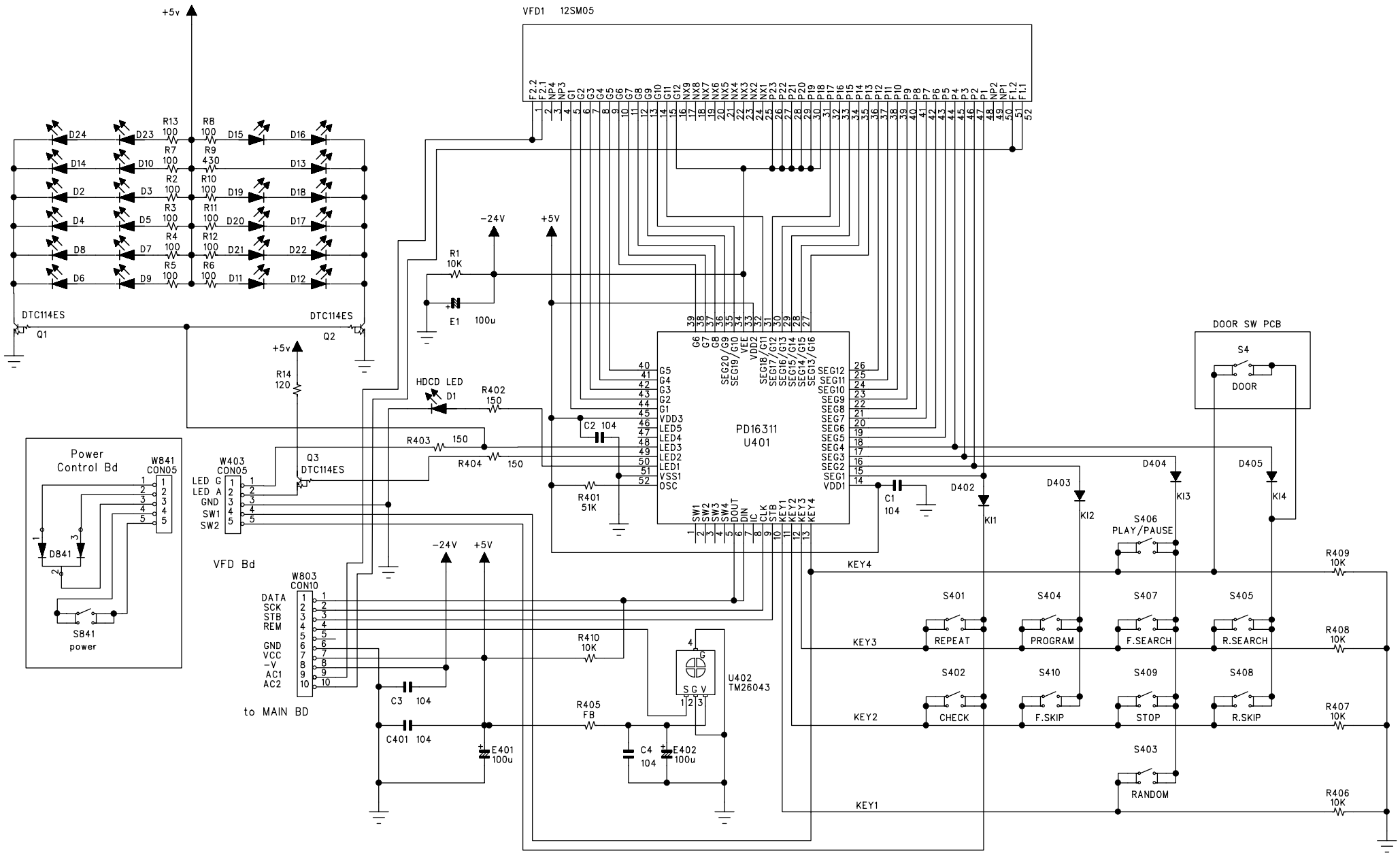
4) Check HCDC Circuit

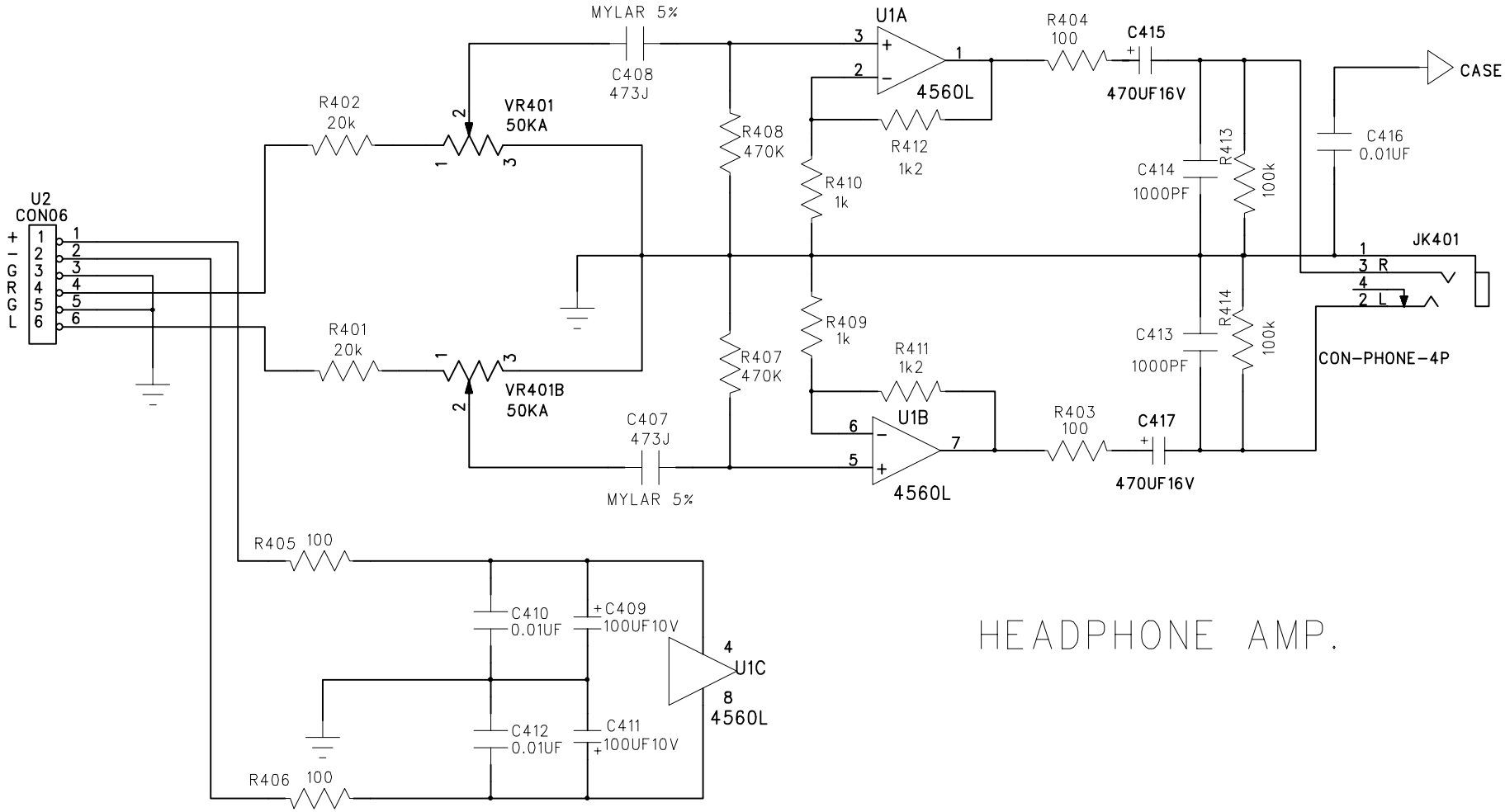



HD750 BLOCK DIAGRAM
RCA JACK
HEAD JACK
TO RCA JACK
DIGITAL OUTPUT
LINE OUT
L,R SIGNAL
LINE OUT
T1
PULSE XFR
HEAD PHONE BOARD
O.AMP I.C. 4560
-8V
+8V
AUDIO FILTER
U1 AND
Q6, Q7, Q12, Q13,
Q15, Q16 AND
Q20, Q21, Q22,
Q23, Q24, Q25
HDCD LEVEL RL2
MOTOR DRIVER TRANSISTOR
Q10, Q30 8050C
Q14, Q29 8550C
OPEN/CLOSE LOADING
DIGITAL SIGNAL
L CHANNEL
R CHANNEL
L,R CHANNEL
IC2
DSP
MN662790
IC14
HDCD DAC
PCM1732
REMOTE SENSOR
DAC +5V OUTPUT
U3
POSITIVE
+5V REGULATOR
GND
+10V INPUT
AUDIO -8V OUTPUT
U13
NEGATIVE
-8V REGULATOR
GND
10VAC INPUT
AUDIO +8V OUTPUT
U12
POSITIVE
+8V REGULATOR
GND
10VAC INPUT
+3V OUTPUT
+8V INPUT
IC5
MOTOR DRIVER
AN8814
IC1
RF FRONT END
AN8849
IC4
MCU
HD6433642
MICROPROCESSOR
VFD DISPLAY
SEGMENT
KEY IN
VFD DISPLAY
KEYBOARD
SPINDLE MOTOR
SLED MOTOR
TRACKING COIL
FOCUSING COIL
LD,PD
A+C,B+D,E,F
LIMIT SWITCH
CD MECHANISM
SONYLASER PICK-UP
+8V OUTPUT
FOR SERVO IC
IC10
POSITIVE
+8V REGULATOR
GND
+10V INPUT
+5V OUTPUT
FOR SERVO IC
IC11
POSITIVE
+5V REGULATOR
GND
+10V INPUT
+5V OUTPUT
FOR MCU
IC9
POSITIVE
+5V REGULATOR
GND
+10V INPUT

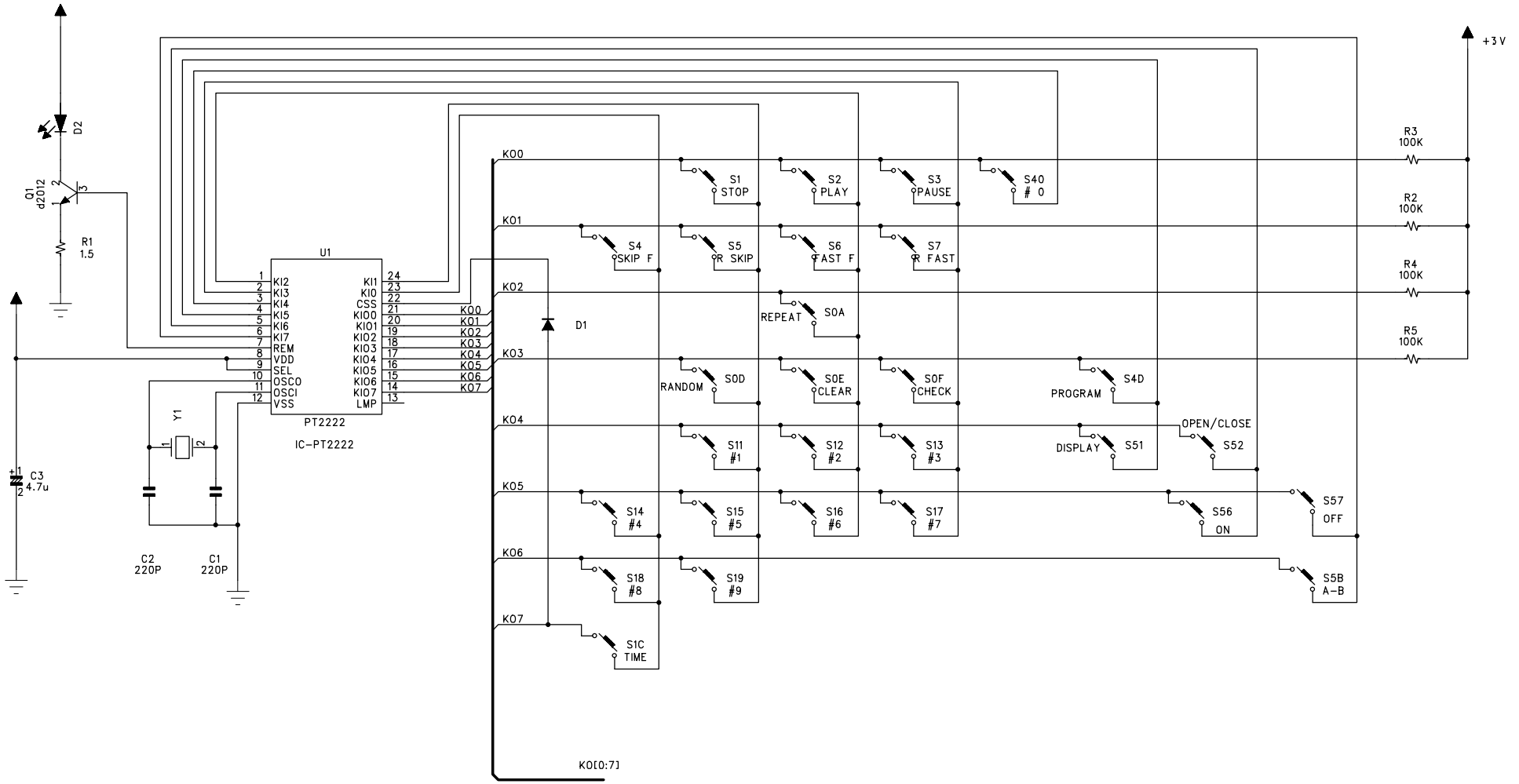


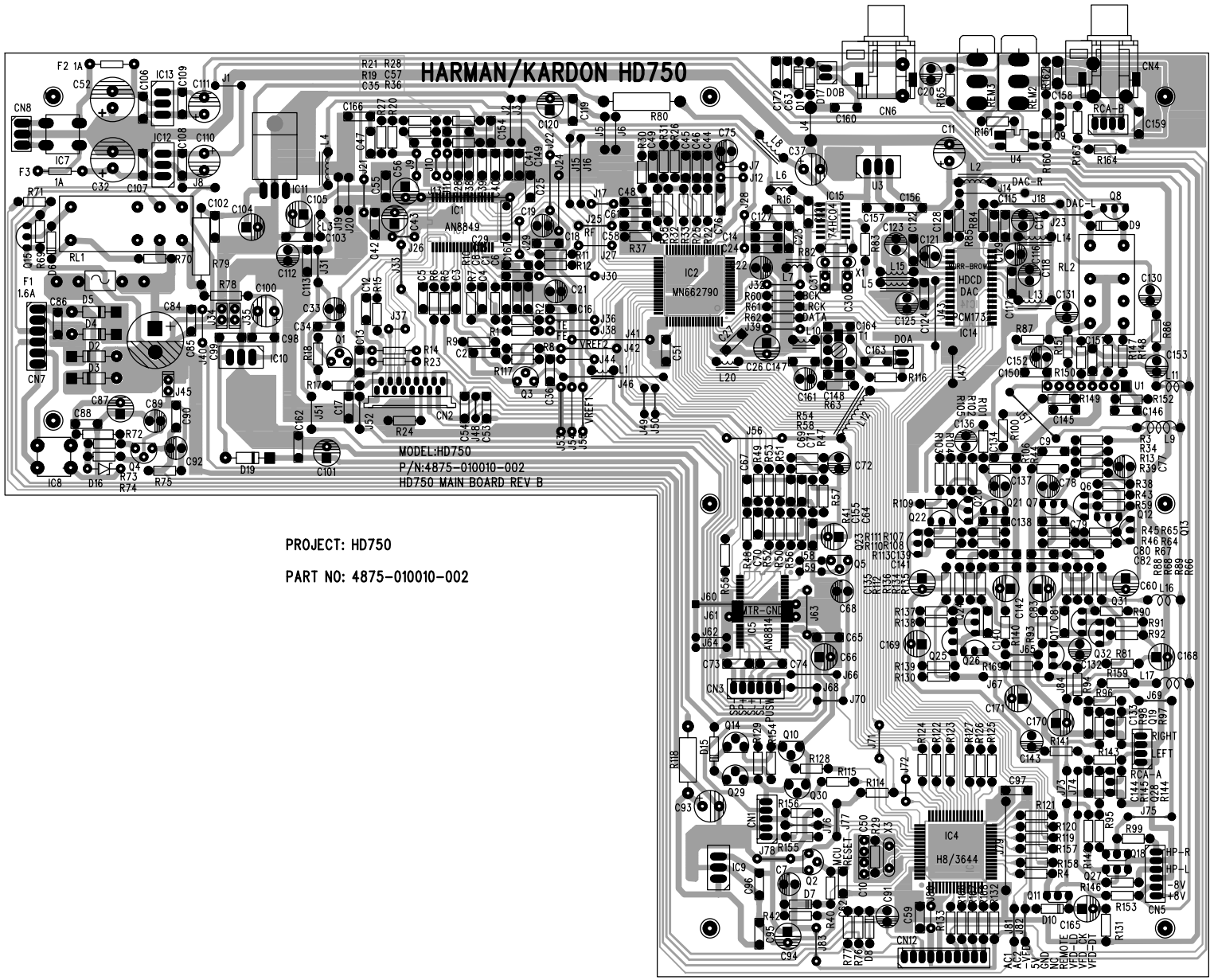
Unless specified: 1. All capacitor ceramic/mono X7R 10%
2. All resistor carbon film 1/8W 5%


+5v
VFD1 12SM05
D24 D23 D15 D16
D14 D10 D13
D2 D3 D19 D18
D4 D5 D20 D17
D8 D7 D21 D22
D6 D9 D11 D12
R13 100
R8 100
R7 100
R9 430
R2 100
R10 100
R3 100
R11 100
R4 100
R12 100
R5 100
R6 100
DTC114ES Q1
DTC114ES Q2
-24V
+5V
R1 10K
E1 100u
R14 120
HDCD LED D1
R402 150
R403 150
R404 150
C2 104
R401 51K
PD16311 U401
C1 104
D402 KI1
D403 KI2
D404 KI3
D405 KI4
DOOR SW PCB
S4 DOOR
Power Control Bd
W841 CON05
D841
S841 power
W403 CON05
LED G
LED A
GND
SW1
SW2
Q3 DTC114ES
VFD Bd
W803 CON10
DATA
SCK
STB
REM
GND
VCC
-V
AC1
AC2
to MAIN BD
R410 10K
C3 104
C401 104
E401 100u
R405 FB
C4 104
E402 100u
U402 TM26043
S406 PLAY/PAUSE
KEY4
R409 10K
S401 REPEAT
S404 PROGRAM
S407 F.SEARCH
S405 R.SEARCH
KEY3
R408 10K
S402 CHECK
S410 F.SKIP
S409 STOP
S408 R.SKIP
KEY2
R407 10K
S403 RANDOM
KEY1
R406 10K


MYLAR 5%
C408
473J
U1A
4560L
R404
100
C415
470UF16V
CASE
R402
20k
VR401
50KA
R408
470K
R412
1k2
C414
1000PF
R413
100k
C416
0.01UF
U2
CON06
+
–
G
R
G
L
R410
1k
JK401
R
L
CON-PHONE-4P
R401
20k
VR401B
50KA
R407
470K
R409
1k
R411
1k2
C413
1000PF
R414
100k
C407
473J
MYLAR 5%
U1B
4560L
R403
100
C417
470UF16V
R405
100
C410
0.01UF
C409
100UF10V
U1C
4560L
C412
0.01UF
C411
100UF10V
R406
100
HEADPHONE AMP.

REMOTE UNIT

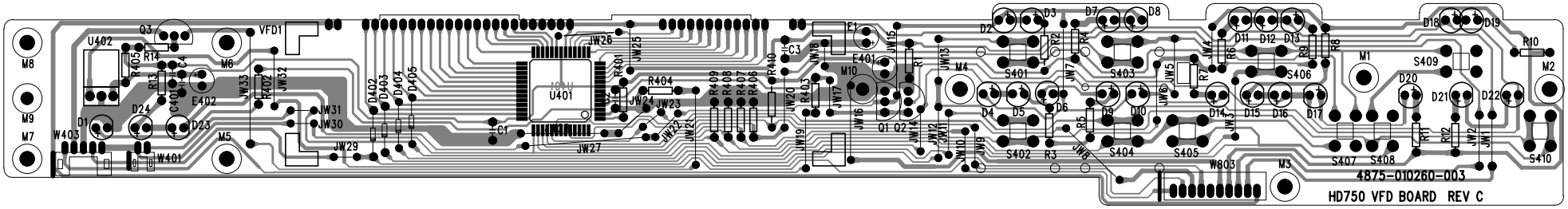

+3 V
D2
Q1
d2012
R1
1.5
U1
KI2
KI3
KI4
KI5
KI6
KI7
REM
VDD
SEL
OSCO
OSCI
VSS
KI1
KI0
CSS
KI00
KI01
KI02
KI03
KI04
KI05
KI06
KI07
LMP
PT2222
IC-PT2222
Y1
C3
4.7u
C2
220P
C1
220P
D1
KO0
KO1
KO2
KO3
KO4
KO5
KO6
KO7
KO[0:7]
S1
STOP
S2
PLAY
S3
PAUSE
S40
0
S4
SKIP F
S5
R SKIP
S6
FAST F
S7
R FAST
S0A
REPEAT
S0D
RANDOM
S0E
CLEAR
S0F
CHECK
S4D
PROGRAM
S11
#1
S12
#2
S13
#3
DISPLAY
S51
OPEN/CLOSE
S52
S14
#4
S15
#5
S16
#6
S17
#7
S56
ON
S57
OFF
S18
#8
S19
#9
S5B
A-B
S1C
TIME
R3
100K
R2
100K
R4
100K
R5
100K



PROJECT: HD750

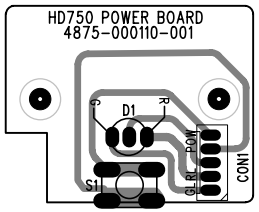
PART NO: 4875-010010-002

DISPLAY PANEL PCB



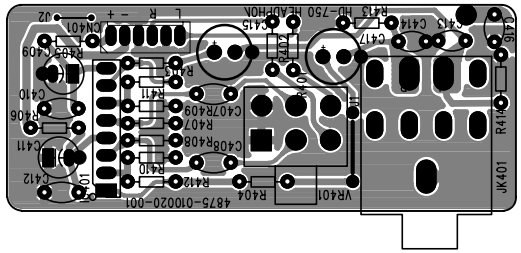
PROJECT : HD750 VFD BOARD
PART NO : 4875-010260-003
SILK SCREEN SIDE (LEVEL : 1,26)

POWER SWITCH PCB



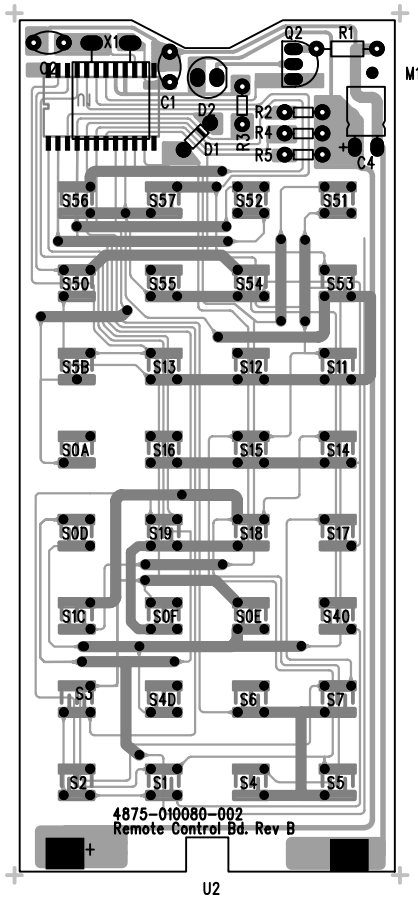
SILK SCREEN

HEADPHONES PCB



P/N : 4875-010020-001
PROJECT : HD-750 HEADPHONE BOARD

SILK SCREEN



PROJECT :

HD750
REMOTE CONTROL BOARD

P/N :

4875-010080-002

SILK SCREEN

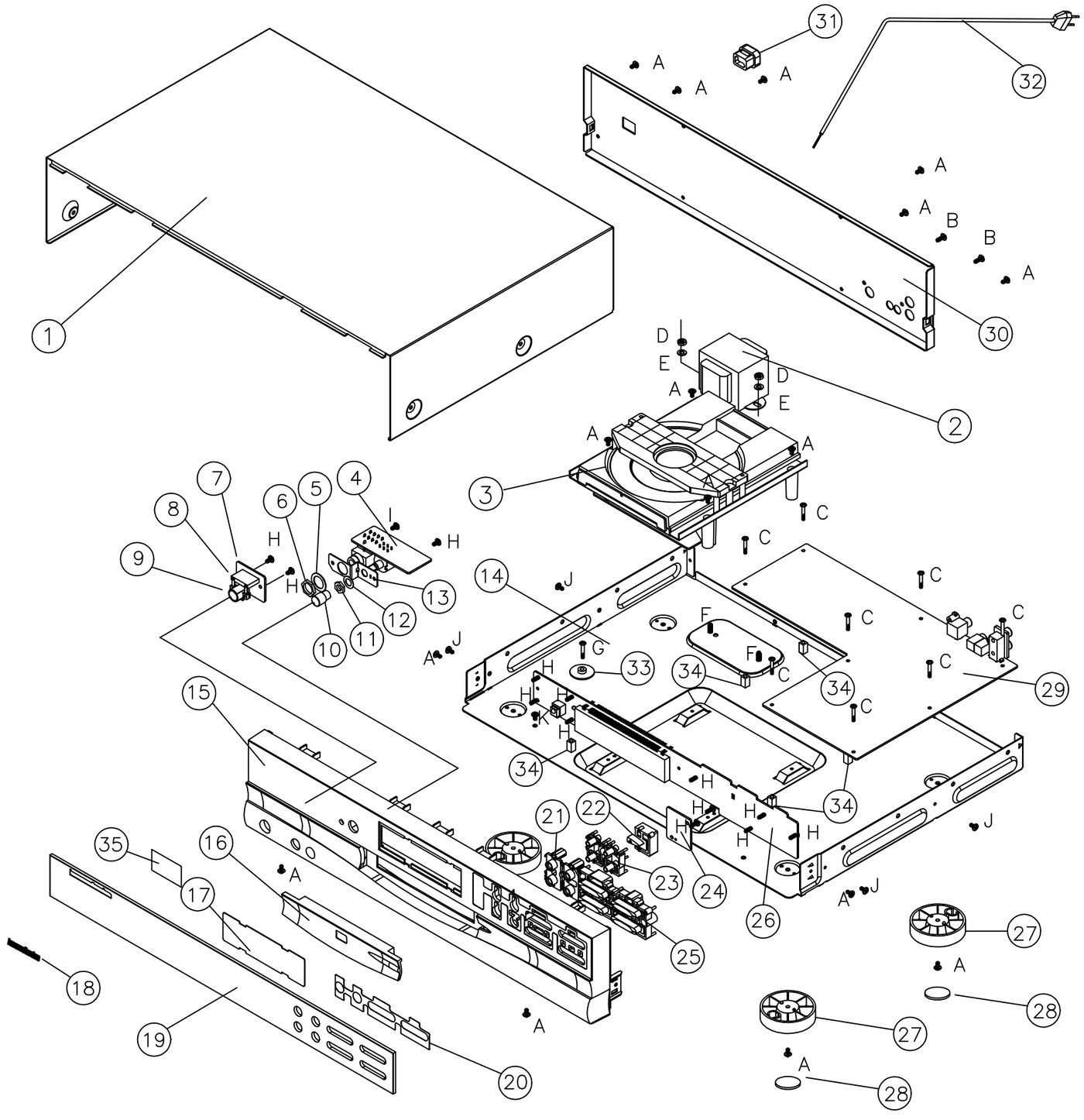
SOLDER SIDE

CARBON

Form No. HKENF960020-01

DO NOT SCALE DRAWING | USE DIMENSION GIVEN

REV.	DESCRIPTION	PROJECT ENGR/DATE	APPROVAL /DATE



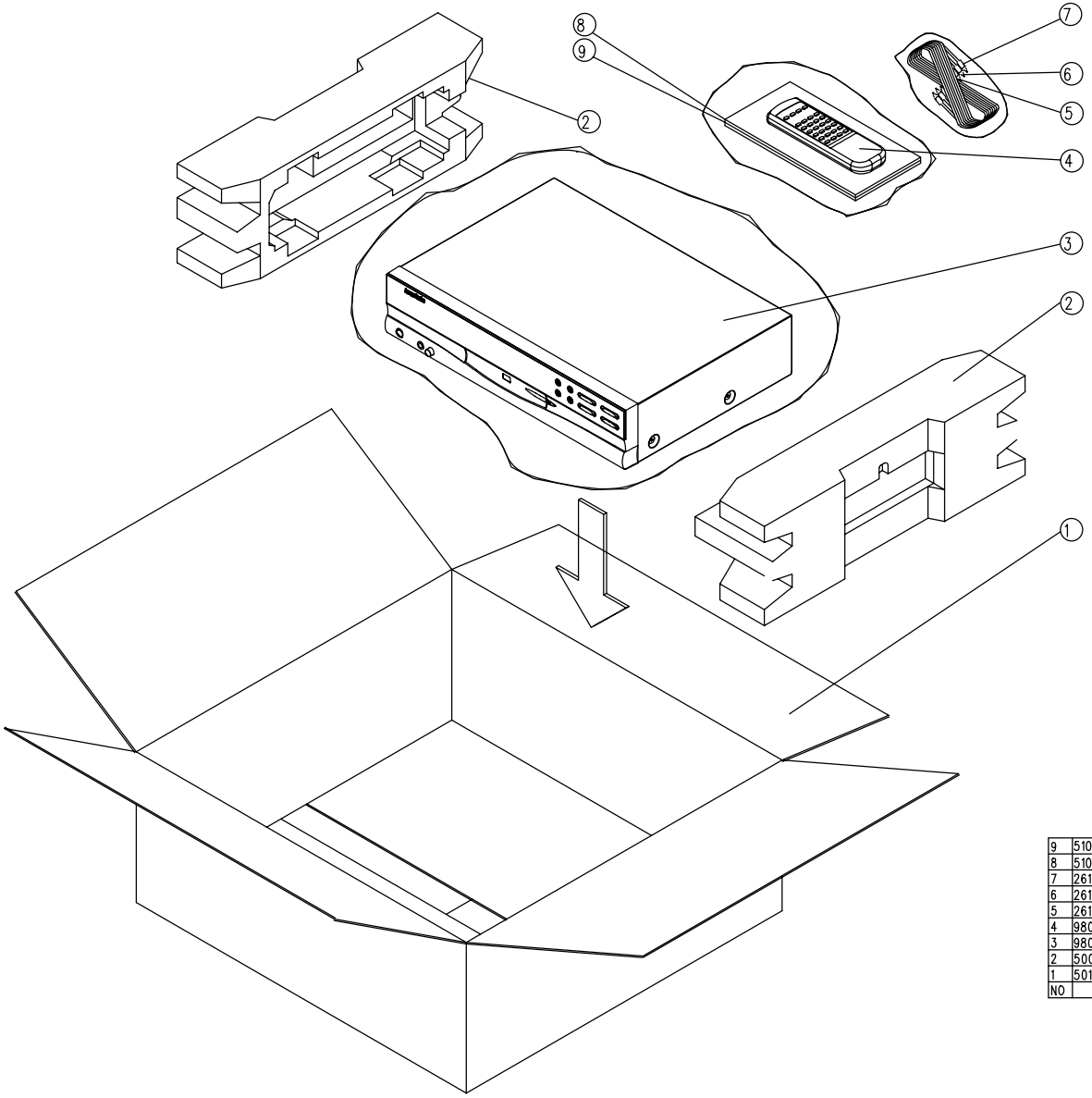
NO	PARTS NO	PARTS NAME	QTY
K	7003-006001-112	SCREW M3X6 STP B/H	1
J	7003-006001-001	SCREW M3X6 STP BW/H BLACK	4
I	7003-006002-111	SCREW M3X6 PTP B/H BLACK	1
H	7003-008002-111	SCREW M3X8 PTP B/H BLACK	13
G	7002-618002-111	SCREW M2.6X18 PTP B/H BLACK	1
F	7004-010010-112	SCREW M4X10 B/H	2
E	7104-010010-022	WASHER M4X10X1MM	2
D	6600-120040-000	SCREW NUT M4X7X3	2
C	7002-616002-111	SCREW M2.6X16 PTP B/H BLACK	8
B	7003-008002-111	SCREW M3X8 PTP B/H (BLACK)	2
A	7003-006001-111	SCREW M3X6 STP B/H (BLACK)	18
35	6075-010007-000	DIFFUSER	1
34	6090-050113-000	CD90 PCB MOUNT (STAND OFF)	9
33	6021-200708-001	YN21Z R.F. PULLEY HOLDER	1
32	2610-218309-015	1830MM AC POWER CORD VFD BLACK (CARRY ON)	1
31	6600-180007-000	AC CORD BUSHING (PG5RF-5B)	1
30	6575-010003-000-01	REAR CABINET, SILKSCREEN	1
29	9475-001000-011	HD750 MAIN BOARD ASSY REV A	1
28	6600-070003-000	CD90R05 RUBBER PAD, LEG	4
27	6029-010012-001-01	PLASTIC FOOT (HOT STAMPING)	4
26	9475-001000-261	HD750 VFD BOARD ASSY REV A	1
25	6083-810007-000-01	BUTTON PLAY, PAINTED	1
24	9475-001000-141	HD750 POWER CONTROL BOARD ASSY REV A	1
23	6075-010005-000-01	BUTTON DISC, PAINTED	1
22	6075-010004-000-01	BUTTON, OPEN/CLOSE, PAIINTED	1
21	6075-010006-000-01	CAP, BUTTON DISC, PAINTED	1
20	6075-010008-000	DIFFUSER	1
19	6075-010003-000-01	HK HD750 DISPLAY LENS (W SILKSCREEN)	1
18	6583-810004-000	HARMAN KARDON LOGO BADGE	1
17	6083-810011-000	FILTER, FL (PVC 0.5)	1
16	6075-010002-000-01	CD DOOR, PAINTED	1
15	6075-010001-000-01	FRONT PANEL, PAINTED	1
14	6575-010001-000-01	W/BLK PAINTED BOTTOM CABINET	1
13	6583-510006-000	BRACKET, PHONES(MIC)	1
12	7107-212004-022	SCREW WASHER M7X12X0.4MM	1
11	6600-120070-000	SCREW HEX NUT M7X0.75X2.0MM	1
10	6083-810013-000-01	KNOB, VR, PAINTED	1
9	6083-810015-000	INDICATOR, STANDBY SAN(MILKY)	1
8	6083-810014-000-01	BUTTON STANDBY, PAINTED	1
7	9475-001000-111	HD750 POWER CONTROL BOARD ASSY REV A	1
6	6600-120120-000	SCREW HEX NUT M12X1.0X2.0MM	1
5	7112-018006-022	SCREW WASHER M12X18X0.6MM	1
4	9475-001000-021	HD750 HEADPHONE BOARD ASSY REV A	1
3	9692-006002-161	PU92TL-216 W/SONY 213CCM REV A	1
2	3200-837000-000	TRANSFORMER E1-48 230V VDE	1
1	6575-010002-000-01	TOP CABINET,PAINTED	1

YANION COMPANY LIMITED

NOTE :
UNLESS OTHERWISE SPECIFIED :
1. TOLERANCE : 0 - 50 mm± 0.10
50 - 100 mm± 0.15
OVER 100 mm± 0.20
ANGLE ± 0.5 DEG.
2. ALL DIMENSIONS ARE IN mm.
3. BREAK ALL SHARP CORNERS.
4. FOR SHEET METAL PARTS, BURRS < 0.04 & < 0.08 AT FINAL CUT OFF PORTION

FINISH		DRAWN BY WXG	CHECKED BY
MODEL HD750		SCALE 1 : 1	SHEET 1 OF 1
MAT'L See BOM		PART NAME Exploded View	
DWG NO. Explode-HD750a	SIZE A1	PART NO. 9801-750000-001	REV. B

APPROVED BY



NO	PARTS NO	PARTS NAME	QTY
9	5100-750100-100	MULTI-LANG 1/B	1
8	5100-837000-200	INTRODUCTION CARD	1
7	2613-210009-000	1M VIDEO CABLE	1
6	2611-310009-000	1M AUDIO CABLE	1
5	2617-210004-001	3.5MM MIC CABLE	1
4	9805-020075-001	REMOTE UNIT(RT02)	1
3	9801-750000-001	HD750 CD PLAYER	1
2	5000-750103-000	POLYFOAM	2
1	5013-750001-000-01	CARTON BOX, PAINTED	1

YANION COMPANY LIMITED

WXG

HD750

PACKING ASSY

PACKING ASSY

9775-001000-001

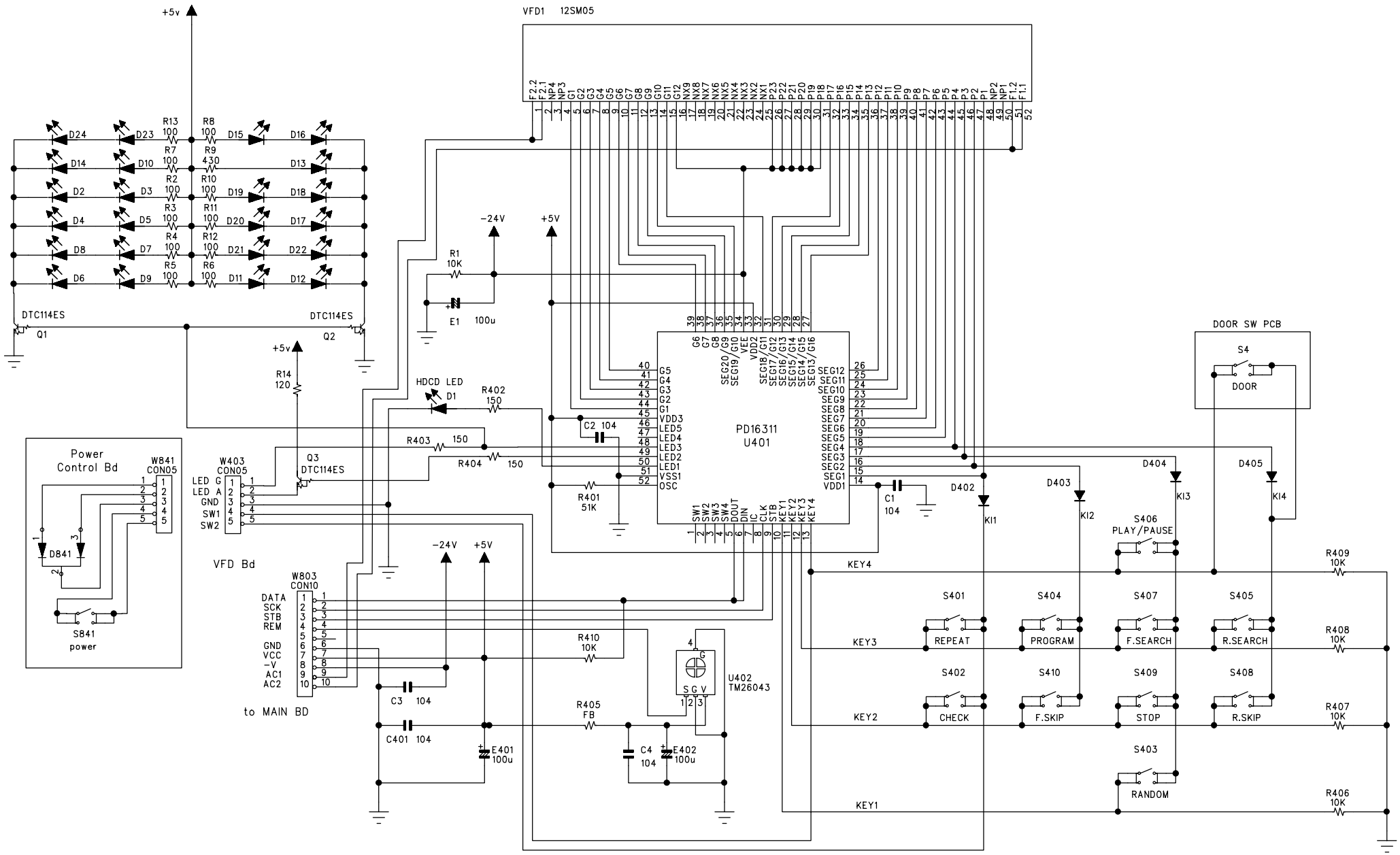
REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

Unless specified: 1. All capacitor ceramic/mono X7R 10%
2. All resistor carbon film 1/8W 5%

COMPANY:			
TITLE:			
DRAWN:	DATED:		
CHECKED:	DATED:	CODE: SIZE: DRAWING NO:	REV:
QUALITY CONTROL:	DATED:		
RELEASED:	DATED:	SCALE:	SHEET: OF

YN	SCHEMATIC DRAWING	FILE NAME : HD750VFD.SCH
		DATE : 2000-07-11

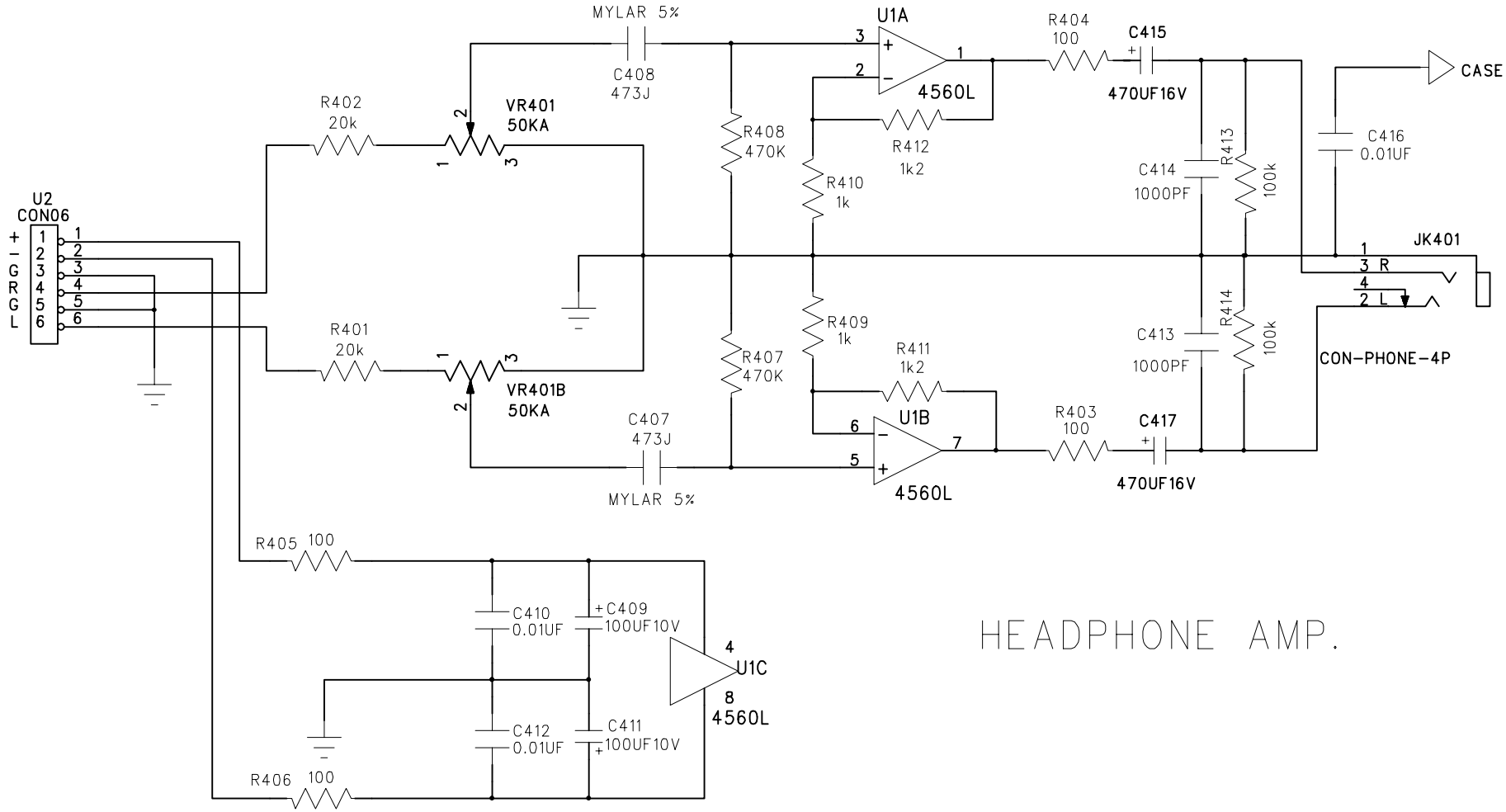
MODEL NO : HD750	ASSY. NO : 9475-001000-261	ASSY NAME : HD750 VFD BOARD ASSY REV B



PURPOSE : SAMPLE MAKING [ ] PRODUCTION [ ]	SHEET 1 of 1	REV B
PREPARED BY :	CHECKED BY :	APPROVED BY :

YN	SCHEMATIC DRAWING	FILENAME : HD-750HP.SCH
		DATE : 2000-08-30

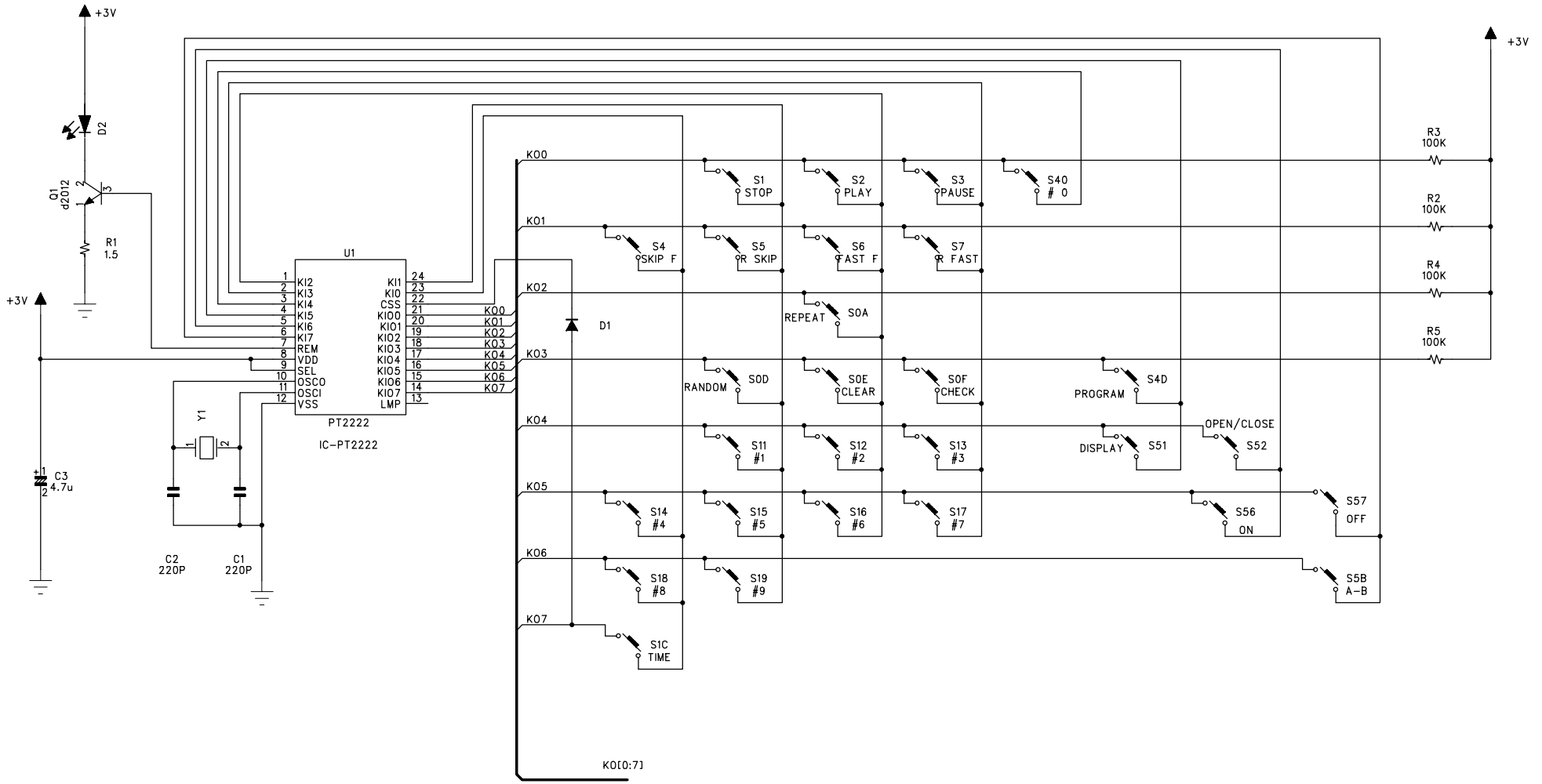
MODEL NO : HD-750 ASSY NO: 9475-001000-021 ASSY NAME : HD-750 HEADPHONE BOARD



PURPOSE :	SAMPLE MAKING [ ] PRODUCTION [ ]	SHEET 1 OF 1	VER.A
PREPARED BY :	CHECK BY :	APPROVED BY :	

YN	SCHEMATIC DRAWING	FILE NAME : HD750REM.SCH
		DATE : 2000-08-16

MODEL NO : HD-750	ASSY. NO : 4875-010080-001	ASSY NAME : REMOTE CONTROL BOARD



PURPOSE : SAMPLE MAKING [ ]	PRODUCTION [X]	SHEET 1 of 1	REV.A
PREPARED BY :	CHECKED BY :	APPROVED BY :	